

# INTRODUCTION

## How to Use This Manual

This manual is divided into 23 sections. The first page of each section is marked with a black tab that lines up with one of the thumb index tabs on this page and the back cover. You can quickly find the first page of each section without looking through a full table of contents. The symbols printed at the top corner of each page can also be used as a quick reference system.

Each section includes:

1. A table of contents, or an exploded view index showing:
  - Parts disassembly sequence.
  - Bolt torques and thread sizes.
  - Page references to descriptions in text.
2. Disassembly/assembly procedures and tools.
3. Inspection.
4. Testing/troubleshooting.
5. Repair.
6. Adjustments.

## Special Information

**WARNING** Indicates a strong possibility of severe personal injury or loss of life if instructions are not followed.

**CAUTION** Indicates a possibility of personal injury or equipment damage if instructions are not followed.

**NOTE** Gives helpful information.

**CAUTION:** Detailed descriptions of *standard* workshop procedures, safety principles and service operations are not included. Please note that this manual does contain warnings and cautions against some specific service methods which could cause **PERSONAL INJURY**, or could damage a vehicle or make it unsafe. Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by HONDA, might be done, or of the possible hazardous consequences of each conceivable way, nor could HONDA investigate all such ways. Anyone using service procedures or tools, whether or not recommended by HONDA, *must satisfy himself thoroughly* that neither personal safety nor vehicle safety will be jeopardized.

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Specifications Apply to U.S.A. and Canada

HONDA MOTOR CO., LTD.  
Service Publication Office

## General Info

## Special Tools



## Specifications

**SPECS**

## Maintenance



## Engine



## Cooling



## Fuel and Emissions



## Transaxle



## Steering



## Suspension



## Brakes (including ABS)



## Body

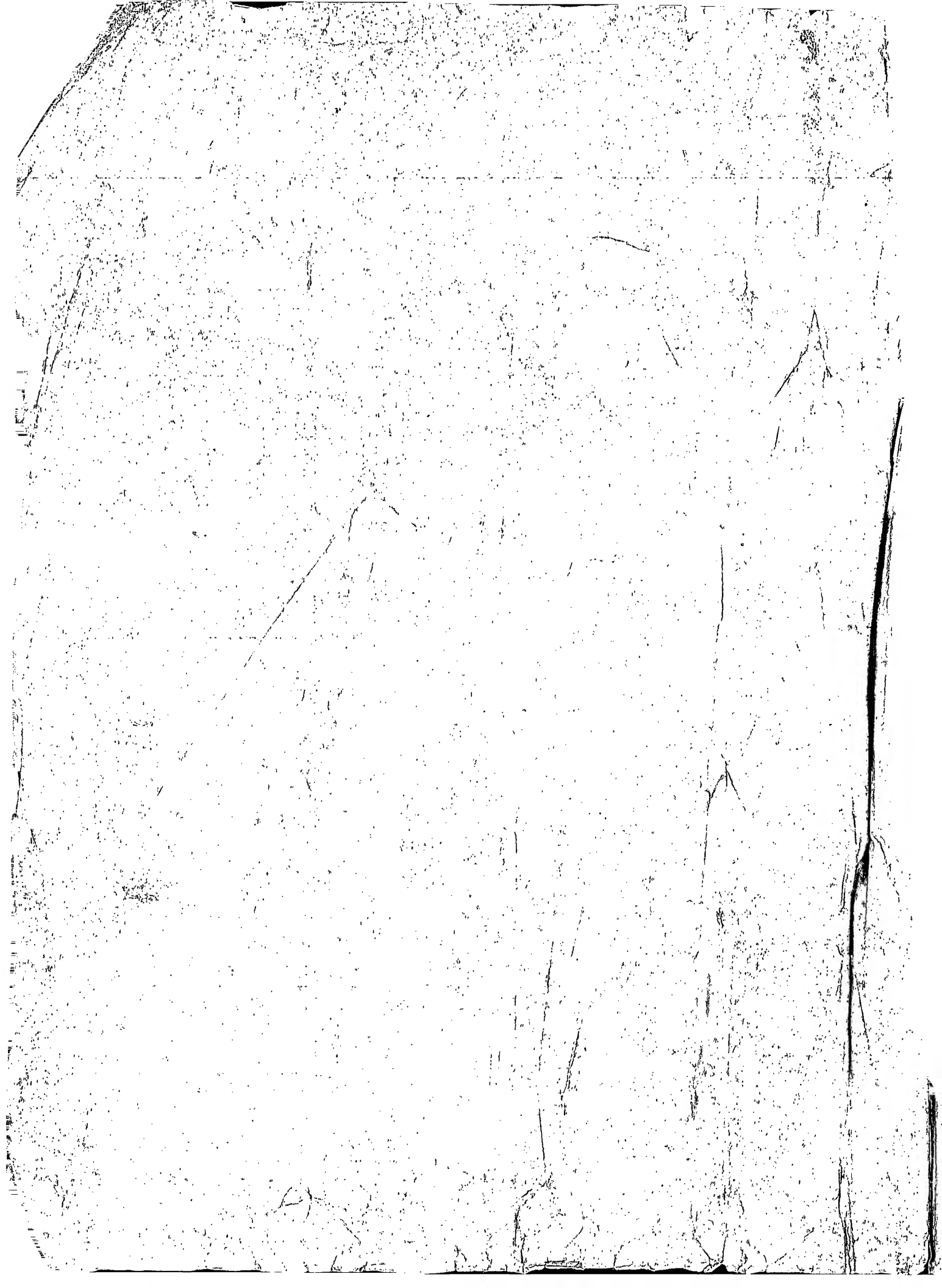


## Heater and Air Conditioning



## Electrical







## **General Information**

Chassis and Paint Codes .....	1-2
Identification Number Locations .....	1-4
Label Locations .....	1-5
Lift and Support Points .....	1-6
Towing .....	1-9

# Chassis and Paint Codes

## U.S. Model

### Vehicle Identification Number

JH4DA934\*PS000001

#### Manufacturer, Make and Type of Vehicle

JH4: HONDA MOTOR CO.,  
LTD. JAPAN.  
ACURA Passenger Car

#### Body type

DA9: INTEGRA 2D-Hatchback 1800  
DB1: INTEGRA 4D-Sedan 1800  
DB2: INTEGRA 2D-Hatchback 1700

#### Body and Transmission Type

3: 2D-Hatchback 5-speed Manual  
4: 2D-Hatchback 4-speed Automatic  
5: 4D-Sedan 5-speed Manual  
6: 4D-Sedan 4-speed Automatic

#### Vehicle Grade

4: RS (DA9, DB1)  
5: LS (DA9, DB1)  
6: GS (DA9, DB1)  
7: GS with leather seats and  
steering wheel cover (DA9, DB1)  
8: GSR (DB2)  
8: LSS (DA9)

#### Check Digit

#### Model Year

P: 1993

#### Factory Code

S: Suzuka Factory

#### Serial Number

### Transmission Number

YS1-1000001

#### Transmission Type

YS1: Manual  
MPRA: Automatic

#### Serial Number

YS1: 1000001~  
MPRA: 3000001~

### Paint Code

Paint Code	Color
B-56M	Saxony Blue Metallic
B-62P	Captiva Blue Metallic
BG-29P	Aztec Green Pearl
G-71P	Isle Green Pearl
NH-503P	Granada Black Pearl
NH-538	Frost White
R-72P	Torino Red Pearl
R-81	Milano Red
RP-21M	Horizon Gray Metallic
YR-503M	Rosewood Brown Metallic

### Engine Number

B17A1-2000001

#### Engine Type

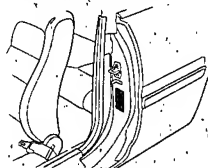
B17A1: 1.7 l DOHC VTEC Sequential  
Multiport Fuel-injection  
B18A1: 1.8 l DOHC Sequential Multiport  
Fuel-injection

#### Serial Number

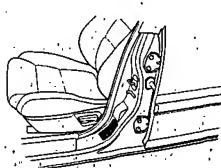
B17A1, California Model: 2000001~  
B17A1, 49 ST Model: 2300001~  
B18A1, California Model: 4000001~  
B18A1, 49ST Model: 4300001~

### Vehicle Identification Number and Federal Motor Vehicle Safety Standard Certification.

2D-Hatchback

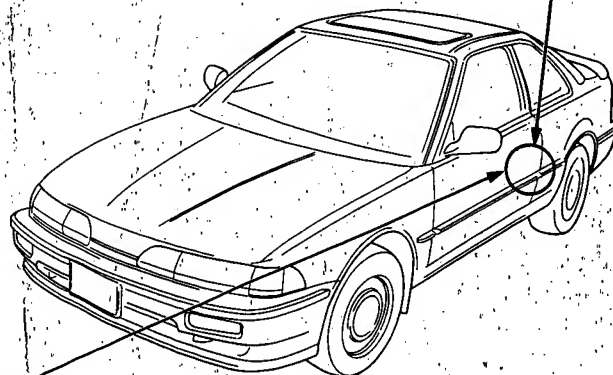


4D-Sedan



### Paint Code

**B-56M**





## Canada Model

### Vehicle Identification Number

JH4DA934\*PS800001

#### Manufacturer, Make and Type of Vehicle

JH4: HONDA MOTOR CO.,  
LTD. JAPAN.  
ACURA Passenger Car

#### Body type

DA9: INTEGRA 2D-Hatchback 1800  
DB1: INTEGRA 4D-Sedan 1800  
DB2: INTEGRA 2D-Hatchback 1700

#### Body and Transmission Type

3: 2D-Hatchback 5-speed Manual  
4: 2D-Hatchback 4-speed Automatic  
5: 4D-Sedan 5-speed Manual  
6: 4D-Sedan 4-speed Automatic

#### Vehicle Grade

4: RS (DA9, DB1)  
5: LS (DA9, DB1)  
6: GS (DA9, DB1)  
7: GS with leather seats and  
steering wheel cover (DA9, DB1)  
8: GSR (DB1)  
8: RS SE (DB1)

#### Check Digit

#### Model Year

P: 1993

#### Factory Code

S: Suzuka Factory

#### Serial Number

### Transmission Number

YS1-1000001

#### Transmission Type

YS1: Manual  
MPRA: Automatic

#### Serial Number

YS1: 1000001 ~  
MPRA: 3000001 ~

### Paint Code

Paint Code	Color
B-59P	Buckingham Blue Pearl
B-62P	Captiva Blue Pearl
BG-29P	Aztec Green Pearl
G-71P	Isle Green Pearl
NH-503P	Granada Black Pearl
NH-538	Frost White
R-72P	Torino Red Pearl
R-81	Milano Red
RP-21M	Horizon Gray Metallic
YR-503M	Rosewood Brown Metallic

### Engine Number

B17A1-2700001

#### Engine Type

B17A1: 1.7 l DOHC VTEC Sequential  
Multiport Fuel-injection  
B18A1: 1.8 l DOHC Sequential Multiport  
Fuel-injection

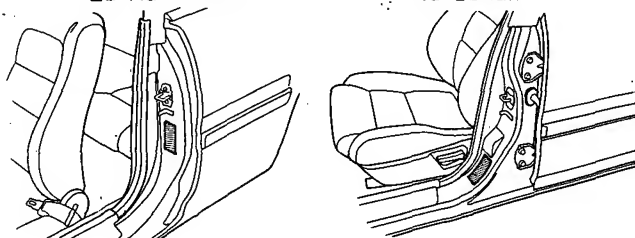
#### Serial Number

B17A1: 2700001  
B18A1: 4700001

### Vehicle Identification Number and Canadian Motor Vehicle Safety Standard Certification.

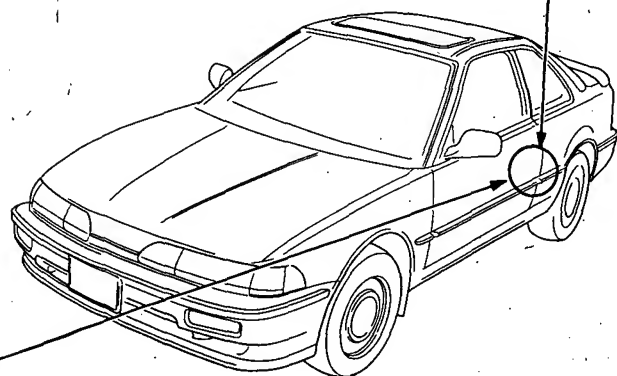
2D-Hatchback

4D-Sedan

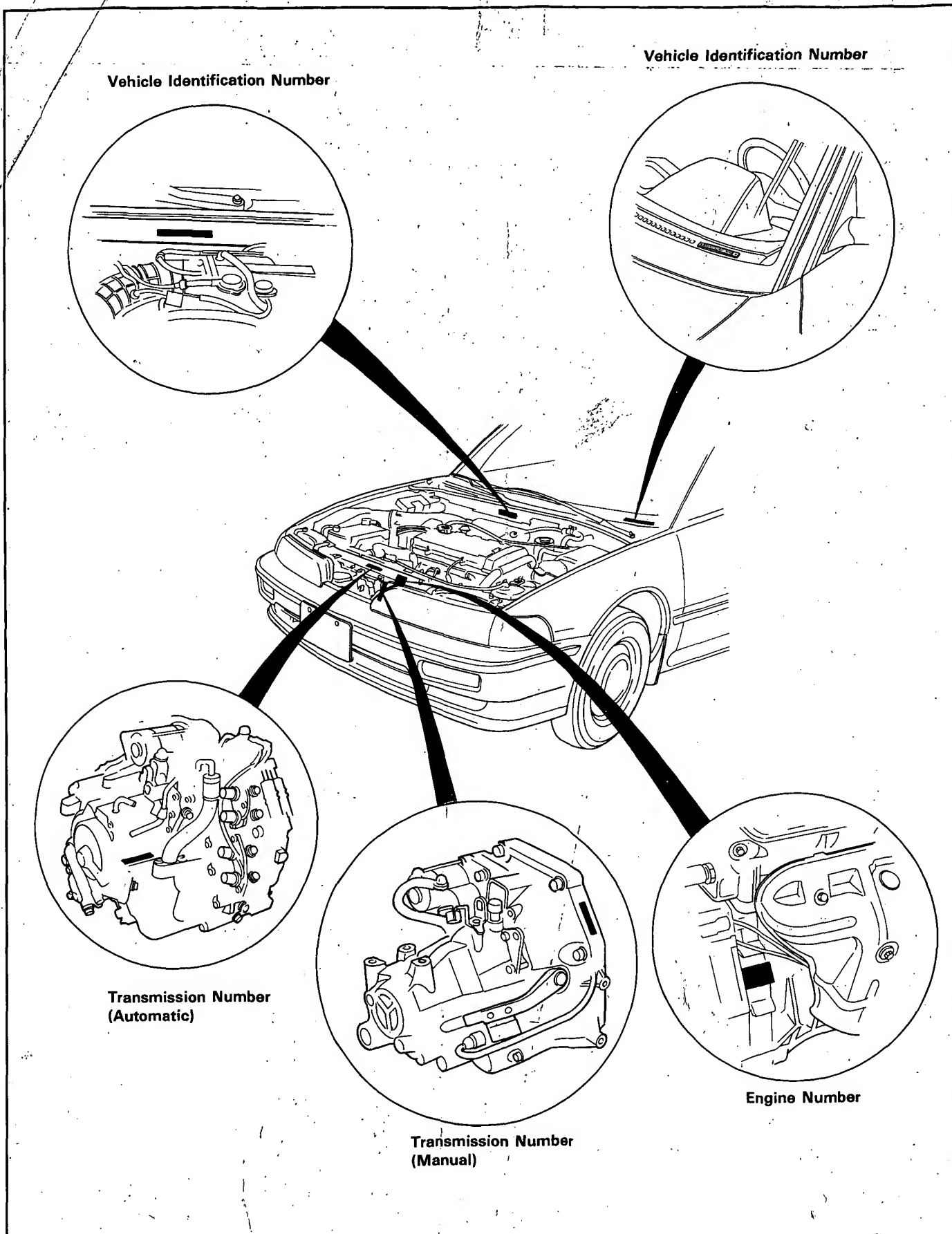


### Paint Code

**B-59P**



# Identification Number Locations



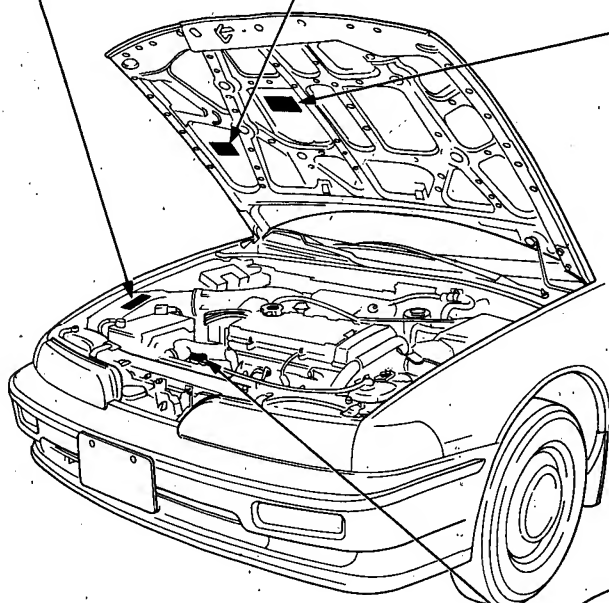
# Label Locations



**AIR CLEANER,  
OIL and FILTER SERVICE**

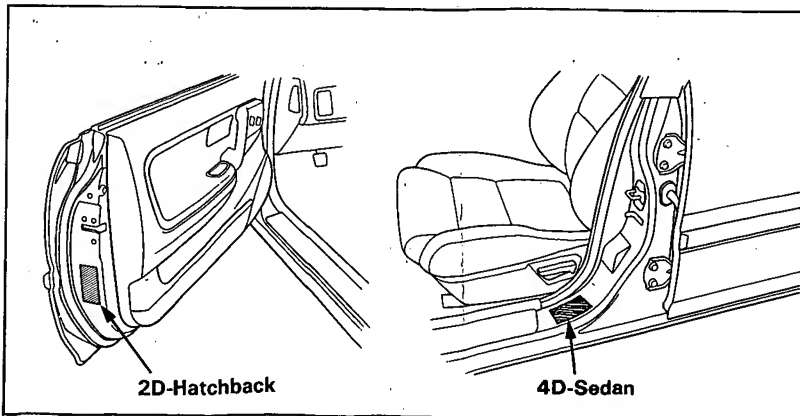
**ABS CAUTION**

**SERVICE INFORMATION**



**RADIATOR CAP  
CAUTION**

## TIRE INFORMATION (DRIVER'S SIDE)



**2D-Hatchback**

**4D-Sedan**

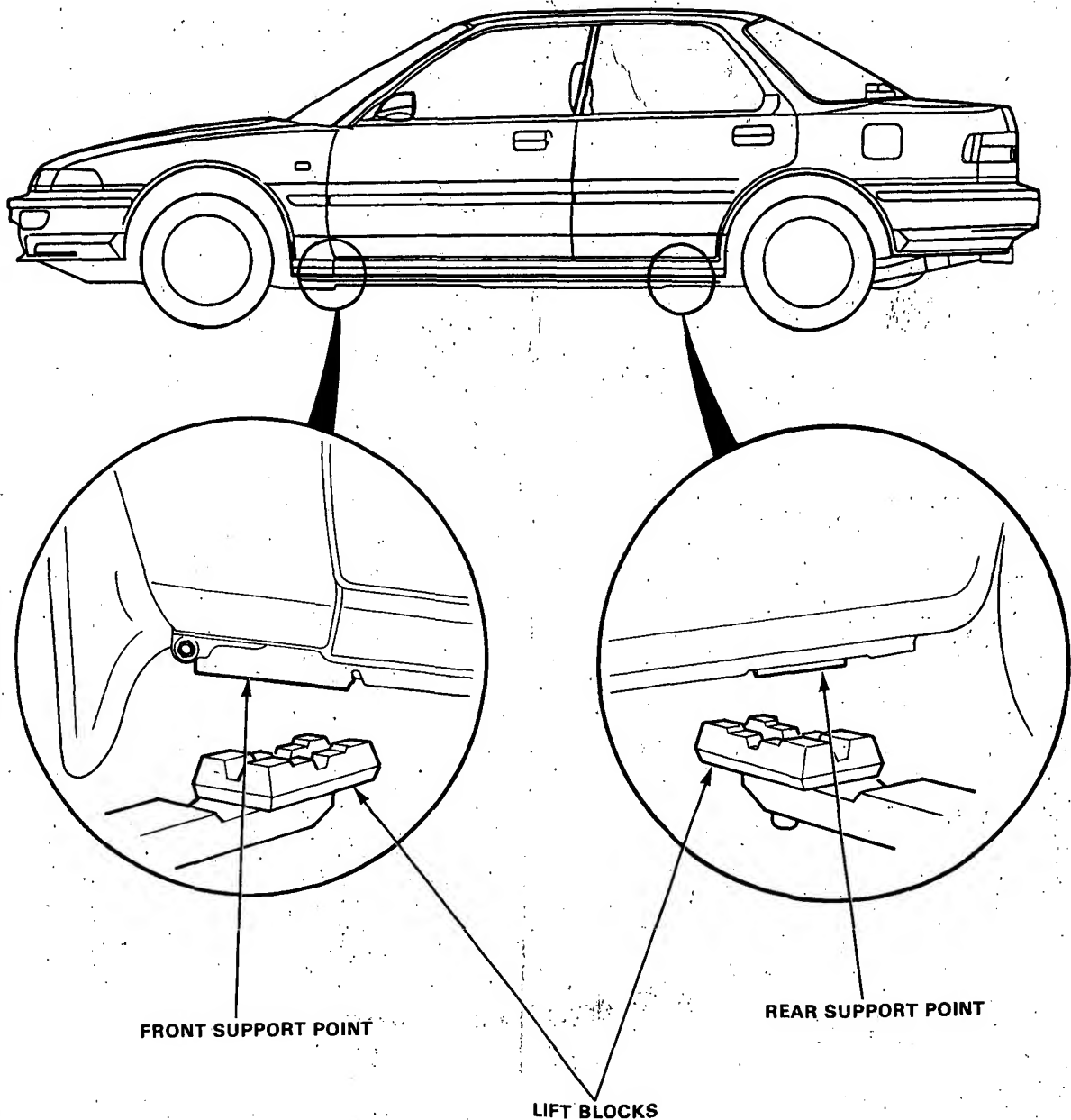
# Lift and Support Points

## Lift

**⚠ WARNING** When heavy rear components such as suspension, fuel tank, spare tire and trunk lid/hatch are to be removed, place additional weight in the trunk before hoisting. When substantial weight is removed from the rear of the car, the center of gravity may change and can cause the car to tip forward on the hoist.

**NOTE:** Since each tire/wheel assembly weights approximately 30 lbs (14 kg), placing the front wheels in the trunk can assist with the weight distribution.

1. Place the lift blocks as shown.
2. Raise the hoist a few inches (centimeters) and rock the car to be sure it is firmly supported.
3. Raise the hoist to full height and inspect lift points for solid support.





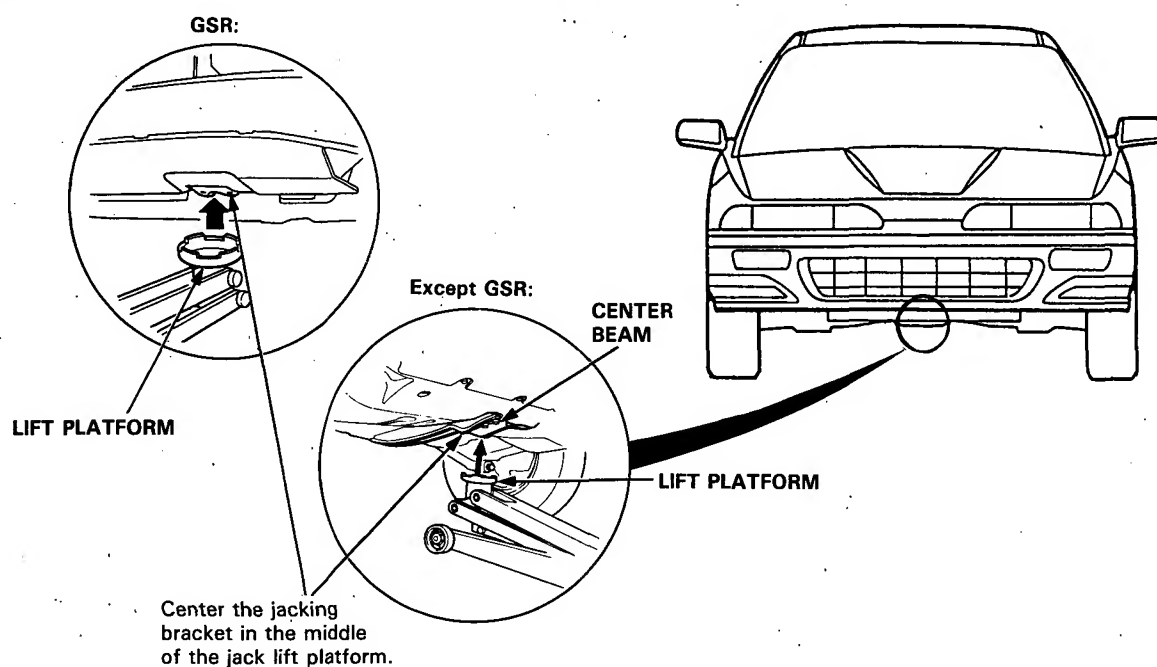
## Floor Jack

1. Set the parking brake and block the wheels that are not being lifted.
2. When lifting the rear of the car, put the gearshift lever in reverse (Automatic transmission in **P** position).
3. Raise the car high enough to insert the safety stands.
4. Adjust and place the safety stands as shown on page 1-8 so the car will be approximately level, then lower the car onto them.

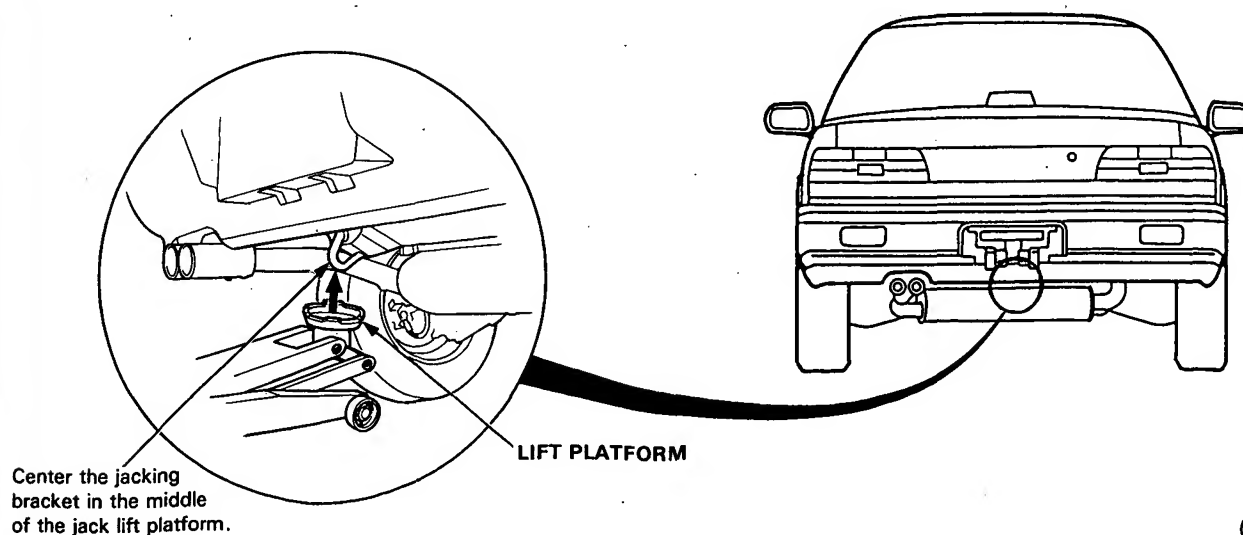
### ▲ WARNING

- Always use safety stands when working on or under any vehicle that is supported only by a jack.
- Never attempt to use a bumper jack for lifting or supporting the car.

### Front



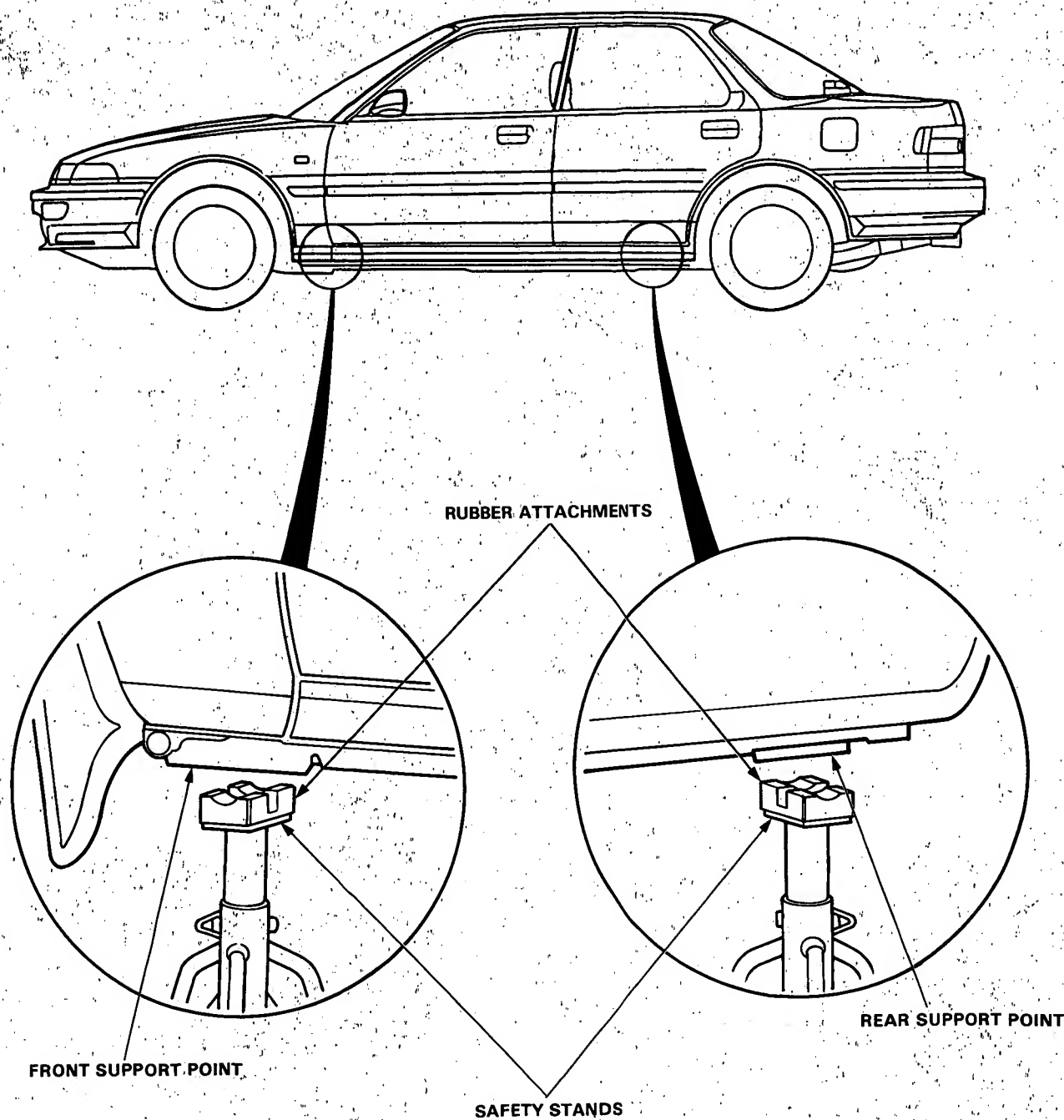
### Rear



(cont'd)

## Lift and Support Points (cont'd)

### Safety Stands





# Towing



**⚠ WARNING** Never use tow chains or rope to tow a car; your ability to safely control the car may be adversely affected.

If towing is necessary, we recommend the following:  
**Flat Bed Equipment**—Entire car is winched on a flat bed vehicle. This is the best way of transporting the car.

**Wheel Lift Type**—Tow with the front wheels off the ground.

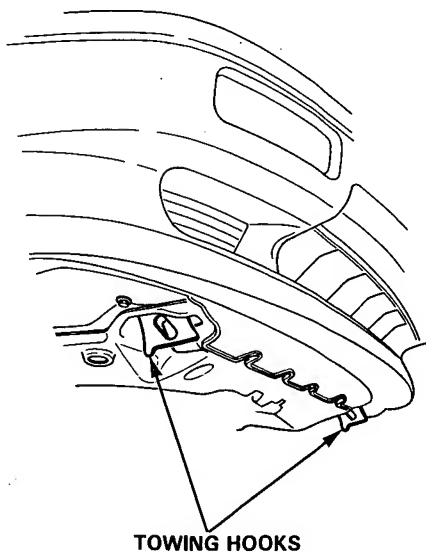
If the car can only be towed with the front wheels on the ground: make sure the transmission is full of fluid (see section 14) and tow with the transmission in neutral (Automatic transmission in **N** position) and the ignition key in the **I** position.

**CAUTION:** To avoid serious damage on automatic transmission cars, first start the engine and shift to **D** position, then to **N** position and shut the engine off. If the engine does not run or the transmission cannot be shifted while the engine is running, the car must be transported on flat bed equipment.

Check local regulations for towing.

**CAUTION:**

- Do not exceed 35 mph (55 km/h) or tow for distances of more than 50 miles (80 km).
- If a sling type tow is used, the tow truck driver should position wood spacer blocks between the car's frame and the chains and lift straps to avoid damaging the bumper and the body.
- Do not use the bumpers to lift the car or to support the car's weight while towing.







## Special Tools

Individual tool lists are located at the front  
of each section.



## **Specifications**

<b>Standards and Service Limits .....</b>	<b>3-2</b>
<b>Design Specifications .....</b>	<b>3-14</b>
<b>Body Specifications .....</b>	<b>3-17</b>

**SPEC**

# Standards and Service Limits

## Cylinder Head/Valve Train — Sections 6 B17A1 engine

	MEASUREMENT			STANDARD (NEW)	SERVICE LIMIT
Compression	250 rpm and wide open throttle kPa (kg/cm <sup>2</sup> , psi)	Nominal Minimum Maximum variation		1,300 (13.0, 184) 950 (9.5, 135) 200 (2.0, 28)	
Cylinder head	Warpage Height			— 141.95—142.05 (5.589—5.593)	0.05 (0.002) —
Camshaft	End play			0.05—0.15 (0.002—0.006)	0.5 (0.02)
	Camshaft-to-holder oil clearance			0.050—0.089 (0.002—0.004)	0.15 (0.006)
	Total runout			0.03 (0.001) max.	0.06 (0.002)
	Cam lobe Height	IN	Primary	33.088 (1.3027)	—
			Mid	36.431 (1.4343)	—
			Secondary	34.978 (1.3771)	—
		EX	Primary	32.785 (1.2907)	—
			Mid	35.720 (1.4063)	—
Valve	Valve clearance (cold)*	IN		0.15—0.19 (0.006—0.007)	—
		EX		0.17—0.21 (0.007—0.008)	—
	Valve stem O.D.	IN		5.475—5.485 (0.2156—0.2159)	5.445 (0.2144)
		EX		5.450—5.460 (0.2146—0.2150)	5.420 (0.2134)
	Stem-to-guide clearance	IN		0.025—0.055 (0.0010—0.0022)	0.08 (0.003)
		EX		0.050—0.080 (0.0020—0.0031)	0.11 (0.004)
Valve seat	Width	IN		1.25—1.55 (0.049—0.061)	2.0 (0.08)
		EX		1.25—1.55 (0.049—0.061)	2.0 (0.08)
	Stem installed height	IN		37.465—37.935 (1.4750—1.4935)	38.185 (1.5033)
		EX		37.165—37.635 (1.4632—1.4817)	37.885 (1.4915)
Valve spring	Free length	IN	Outer	40.92 (1.611) *1	—
				40.91 (1.610) *2	—
			Inner	36.71 (1.445) *1	—
		EX		41.96 (1.652) *1 41.94 (1.651) *2	—
Valve guide	I.D.	IN		5.51—5.53 (0.217—0.218)	5.55 (0.219)
		EX		5.51—5.53 (0.217—0.218)	5.55 (0.219)
	Installed height	IN		12.55—13.05 (0.494—0.514)	—
		EX		12.55—13.05 (0.494—0.514)	—
Rocker arm	Arm-to-shaft clearance	IN		0.025—0.052 (0.0009—0.0020)	0.08 (0.003)
		EX		0.025—0.052 (0.0009—0.0020)	0.08 (0.003)

\*Measuring point between camshaft and rocker arm

\*1: NIHON HATSUJO manufacture valve spring, \*2: CHUO HATSUJO manufacture valve spring.

## Cylinder Head/Valve Train — Sections 6

### B18A1 engine

Unit of length: mm (in)

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	250 rpm and wide open throttle kPa (kg/cm <sup>2</sup> , psi)	Nominal Minimum Maximum variation	1,300 (13.0, 185) 950 (9.5, 135) 200 (2.0, 28)	
Cylinder head	Warpage Height		— 131.95—132.05 (5.195—5.199)	0.05 (0.002) —
Camshaft	End play Camshaft-to-holder oil clearance Total runout Cam lobe Height	IN EX	0.05—0.15 (0.002—0.006) 0.050—0.089 (0.002—0.004) 0.03 (0.001) 33.716 (1.3274) 33.230 (1.3083)	0.5 (0.02) 0.15 (0.006) 0.06 (0.002) — —
Valve	Valve clearance (cold)* Valve stem O.D. Stem-to-guide clearance Stem installed height	IN EX IN EX IN EX	0.08—0.12 (0.003—0.005) 0.16—0.20 (0.006—0.008) 6.58—6.59 (0.259—0.259) 6.55—6.56 (0.258—0.258) 0.02—0.05 (0.001—0.002) 0.05—0.08 (0.002—0.003) 40.765—41.235 (1.6049—1.6234) 42.765—43.235 (1.6837—1.7022)	— — 6.55 (0.258) 6.52 (0.257) 0.08 (0.003) 0.11 (0.004) 41.485 (1.6333) 43.485 (1.7120)
Valve seat	Width	IN and EX	1.25—1.55 (0.049—0.061)	2.0 (0.079)
Valve spring	Free length	IN EX	42.36 (1.668) 40.09 (1.578)	— —
Valve guide	I.D.	IN and EX	6.61—6.63 (0.260—0.261)	6.65 (0.262)

\*Measuring point between camshaft and rocker arm

## Engine Block — Section 7

### B17A1 engine

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface Bore diameter Bore taper Reboring limit	X Y	0.05 (0.002) 81.000—81.020 (3.1890—3.1898) 81.000—81.015 (3.1890—3.1896) —	0.08 (0.003) 81.070 (3.1917) 0.05 (0.002) 0.25 (0.010)
Piston	Skirt O.D. At 15 mm (0.6 in) from bottom of skirt Clearance in cylinder Ring groove width	Top 2nd Oil	80.980—80.990 (3.1882—3.1886) 0.010—0.035 (0.0004—0.0014) 1.030—1.040 (0.0406—0.0409) 1.230—1.240 (0.0484—0.0488) 2.805—2.820 (0.1104—0.1110)	80.970 (3.1878) 0.05 (0.002) 1.060 (0.0417) 1.260 (0.0496) 2.840 (0.1118)
Piston ring	Piston-to-ring clearance Ring end gap	Top 2nd Top 2nd Oil	0.045—0.070 (0.0018—0.0028) 0.045—0.070 (0.0018—0.0028)*1 0.040—0.065 (0.0015—0.0026)*2 0.20—0.30 (0.008—0.012)*1 0.20—0.35 (0.008—0.014)*2 0.40—0.55 (0.016—0.022) 0.20—0.45 (0.008—0.018)*1 0.20—0.50 (0.008—0.020)*2	0.13 (0.005) 0.13 (0.005) 0.60 (0.024) 0.70 (0.028) 0.70 (0.028)
Piston Pin	Diameter Pin-to-piston clearance		20.994—21.000 (0.8265—0.8268) 0.010—0.022 (0.0004—0.0009)	— —
Connecting rod	Pin-to-rod interference Small end bore diameter Large end bore diameter End play installed on crankshaft	Nominal	0.013—0.032 (0.0005—0.0013) 20.968—20.981 (0.8255—0.8260) 48.0 (1.89) 0.15—0.30 (0.006—0.012)	— — — 0.40 (0.016)
Crankshaft	Main journal diameter No. 1, 2, 4 and 5 journals No. 3 journal Rod journal diameter Journal taper Journal out-of-round End play Total runout		54.976—55.000 (2.1644—2.1654) 54.970—54.994 (2.1642—2.1651) 44.976—45.000 (1.7707—1.7717) 0.005 (0.0002) max. 0.004 (0.0002) max. 0.10—0.35 (0.004—0.014) 0.020 (0.0008) max.	— — — — 0.006 (0.0002) 0.45 (0.018) 0.030 (0.0012)
Bearings	Main bearing-to-journal oil clearance No. 1, 2, 4 and 5 journals No. 3 journal Rod bearing-to-journal oil clearance		0.024—0.042 (0.0009—0.0017) 0.030—0.048 (0.0012—0.0019) 0.032—0.050 (0.0013—0.0020)	0.050 (0.0020) 0.060 (0.0024) 0.060 (0.0024)

\*1: TEIKOKU PISTON RING manufacture piston ring

\*2: RIKEN manufactured piston ring

# Standards and Service Limits

## Engine Block — Section 7

### B18A1 engine

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface		below 0.07 (0.003)	0.10 (0.004)
	Bore diameter	X	81.000—81.020 (3.1890—3.1898)	81.070 (3.1917)
		Y	81.000—81.015 (3.1890—3.1896)	81.070 (3.1917)
	Bore taper		—	0.05 (0.002)
	Reboring limit		—	0.25 (0.01)
Piston	Skirt O.D. At 15 mm (0.6 in) from bottom of skirt		80.980—80.990 (3.1882—3.1886)	80.970 (3.1878)
	Clearance in cylinder		0.010—0.035 (0.0004—0.0014)	0.05 (0.002)
	Ring groove width	Top	1.030—1.040 (0.0406—0.0409)	1.06 (0.042)
		2nd	1.230—1.240 (0.0484—0.0488)	1.26 (0.050)
		Oil	2.805—2.820 (0.1104—0.1110)	2.84 (0.112)
	Piston-to-ring clearance	Top	0.045—0.070 (0.0018—0.0028)	0.13 (0.005)
		2nd	0.045—0.070 (0.0018—0.0028)*1	0.13 (0.005)
			0.045—0.065 (0.0018—0.0026)*2	
Piston ring	Ring end gap	Top	0.20—0.30 (0.008—0.012)*1	0.70 (0.028)
			0.20—0.35 (0.008—0.014)*2	
		2nd	0.40—0.55 (0.016—0.022)	0.70 (0.028)
		Oil	0.20—0.45 (0.008—0.018)*1	0.60 (0.024)
			0.20—0.50 (0.008—0.020)*2	
Piston Pin	O.D.		20.994—21.000 (0.8265—0.8268)	—
	Piston-to-pin clearance		0.010—0.022 (0.0004—0.0009)	—
Connecting rod	Pin-to-rod interference		0.013—0.032 (0.0005—0.0013)	—
	Small end bore diameter		20.968—20.981 (0.8255—0.8260)	—
	Large end bore diameter	Nominal	48.0 (1.89)	—
	End play installed on crankshaft		0.15—0.30 (0.006—0.012)	0.40 (0.016)
Crankshaft	Main journal diameter		54.976—55.000 (2.1644—2.1654)	—
	No. 1, 2, 4, 5 journals		54.970—54.994 (2.1642—2.1651)	—
	No. 3 journal		below 0.005 (0.0002)	0.010 (0.0004)
	Journal taper		below 0.005 (0.0002)	—
	Rod journal diameter		44.976—45.000 (1.7707—1.7717)	—
	Journal out-of-round		below 0.005 (0.0002)	0.010 (0.0004)
	End play		0.10—0.35 (0.004—0.014)	0.45 (0.018)
	Total runout		below 0.03 (0.001)	0.05 (0.002)
Bearings	Main bearing-to-journal oil clearance		0.024—0.042 (0.0009—0.0017)	0.050 (0.0020)
	No. 1, 2, 4, 5 journals		0.030—0.048 (0.0012—0.0019)	0.060 (0.0024)
	No. 3 journal		0.020—0.038 (0.0008—0.0015)	0.050 (0.0020)
	Rod bearing-to-journal oil clearance			

\*1 TEIKOKU PISTON RING manufactured piston ring.

\*2 RIKEN manufactured piston ring.

## Engine Lubrication — Section 8

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Engine oil	Capacity: including oil filter ℓ (US qt, Imp qt)	B18A1 engine: 3.8 (4.0, 3.3) for change B17A1 engine: 4.0 (4.2, 3.5) for change B18A1 engine: 4.6 (4.9, 4.0) for engine overhaul B17A1 engine: 4.8 (5.1, 4.2) for engine overhaul	
Oil pump	Displacement ℓ (US qt, Imp qt)/min @rpm	56 (54/49) @6,000	
	Inner-to-outer rotor radial clearance	0.04—0.16 (0.002—0.006)	0.20 (0.008)
	Pump housing-to-rotor radial clearance	0.10—0.19 (0.004—0.007)	0.20 (0.008)
	Pump housing-to-rotor axial clearance	0.02—0.07 (0.001—0.003)	0.15 (0.006)
Relief valve	Pressure setting with oil temperature 176°F (80°C) kPa (kg/cm <sup>2</sup> , psi) at idle at 3,000 rpm	above 70 (0.7, 10) above 350 (3.5, 50)	



## Cooling — Section 10

	MEASUREMENT	STANDARD (NEW)
Engine coolant	Capacity ℓ (US qt, Imp qt) : including heater 0.6 ℓ (0.6 US qt, 0.5 Imp qt) and reservoir 0.6 ℓ (0.6 US qt, 0.5 Imp qt)	M/T: 5.1 (5.4, 4.5) for change*1 5.0 (5.3, 4.4) for change*2 6.0 (6.3, 5.3) for engine overhaul*1 5.9 (6.2, 5.2) for engine overhaul*2 A/T: 4.9 (5.2, 4.3) for change 5.8 (6.1, 5.1) for engine overhaul
Radiator cap	Opening pressure kPa (kg/cm <sup>2</sup> , psi)	75—105 (0.75—1.05, 11—15)
Thermostat	Start to open °F (°C) Fully open °F (°C) Valve lift at fully open	169—176 (76—80) 194 (90) 8.0 (0.31)
Water pump	Pulley ratio Displacement ℓ (US qt, Imp qt)/min @rpm	0.895 (17 : 19) 140 (148, 123) @6,000
Cooling fan	Thermoswitch "ON" temperature °F (°C) Thermoswitch "OFF" temperature °F (°C)	196—203 (91—95) Subtract 5—15 (3—8) from actual "ON" temperature

\*1: B18A1 engine

\*2: B17A1 engine

## Fuel and Emission — Section 11

	MEASUREMENT	STANDARD (NEW)
Fuel pump	Displacement cc (US oz, Imp oz) in 10 seconds at 12 V  Relief valve opening pressure	B18A1 engine: above 230 (7.8, 8.1) B17A1 engine: above 208 (7.0, 7.3)  450—600 (4.5—6.0, 64—85)
Pressure regulator	Pressure with the regulator vacuum hose disconnected kPa (kg/cm <sup>2</sup> , psi)	B18A1 engine: 290—340 (2.9—3.4, 41—48) B17A1 engine: 340—390 (3.4—3.9, 48—56)
Fuel tank	Capacity ℓ (US gal, Imp gal)	50 (13.2, 11.0)
Fast idle	rpm at engine cold (engine coolant temperature below 86°F (30°C)) with headlight and cooling fan OFF	M/T: 1,000—2,000 A/T: 1,000—2,000 in <b>N</b> or <b>P</b>
Idle speed	rpm with headlight and cooling fan OFF	M/T: 750 ± 50*1 800 ± 50*2 A/T: 750 ± 50 in <b>N</b> or <b>P</b> position
	rpm with air conditioning ON	M/T: 750 ± 50*1 800 ± 50*2 A/T: 750 ± 50 in <b>N</b> or <b>P</b> position
Idle CO	% with headlight and cooling fan OFF	below 0.1%

\*1: B18A1 engine

\*2: B17A1 engine

# Standards and Service Limits

## Clutch — Section 12

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Clutch pedal	Pedal height to floor	177 (6.97)	—
	Pedal stroke	142–147 (5.59–5.79)	—
	Pedal play	15–20 (0.59–0.79)	—
	Disengagement height to floor	90 (3.54) min.	—
Clutch releases arm	Free play at arm	4.00–5.00 (0.157–0.197)	—
Flywheel	Clutch surface runout	0.05 (0.002)	0.15 (0.006)
Clutch disc	Surface runout	0.80 (0.031)	1.00 (0.039)
	Rivet head depth	1.30 (0.051)	0.20 (0.008)
	Radial play in spline at circumference	0.10–0.60 (0.004–0.024)	2.00 (0.079)
	Thickness	8.40–9.10 (0.331–0.358)	6.00 (0.239)
Clutch cover	Pressure disc surface runout	0.03 (0.001)	0.15 (0.006)
	Unevenness of diaphragm spring	0.60 (0.024)	1.00 (0.039)
Clutch releases bearing holder	I.D.	35.00–35.12 (1.378–1.383)	35.20 (1.386)
	Holder-to-guide sleeve clearance	0.05–0.19 (0.002–0.008)	0.30 (0.012)

## Manual Transmission — Section 13

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission oil	Capacity ℓ (US qt, Imp qt)	2.3 (2.4, 2.0) for overhaul 2.2 (2.3, 1.9) for oil change	
Mainshaft	End play	0.11–0.18 (0.004–0.007)	Adjust with a shim.
	Diameter of ball bearing contact area, clutch housing side	27.977–27.990 (1.1015–1.1020)	27.93 (1.100)
	Diameter of 3rd gear contact area	37.984–38.000 (1.4954–1.4961)	37.93 (1.493)
	Diameter of ball bearing contact area, transmission housing side	27.987–28.000 (1.1018–1.1024)	27.94 (1.100)
Mainshaft 3rd and 4th gears	Runout	0.02 (0.0008)	0.05 (0.0020)
	I.D.	43.009–43.025 (1.6933–1.6939)	43.08 (1.696)
	End play	0.06–0.21 (0.003–0.008)	0.30 (0.012)
	Thickness	3rd: B17A1 engine B18A1 engine 4th: B17A1 engine B18A1 engine	34.3 (1.350) 34.42–34.47 (1.355–1.357) 31.3 (1.232) 30.8 (1.213)
Mainshaft 5th gear	I.D.	43.009–43.025 (1.6933–1.6939)	43.08 (1.693)
	End play	0.06–0.21 (0.003–0.008)	0.30 (0.012)
	Thickness	31.42–31.47 (1.237–1.239)	31.3 (1.232)
Countershaft	Diameter of needle bearing contact area	33.000–33.015 (1.2992–1.2998)	32.95 (1.297)
	Diameter of ball bearing contact area	24.980–24.993 (0.9835–0.9840)	24.94 (0.982)
	Diameter of 1st gear contact area	36.984–37.000 (1.4561–1.4567)	36.93 (1.454)
	Runout	0.02 (0.001)	0.05 (0.002)
Countershaft 1st gear	I.D.	42.009–42.025 (1.6539–1.6645)	42.08 (1.657)
	End play, after tightening with specified torque	0.04–0.12 (0.002–0.005)	Adjust with a shim.
Countershaft 2nd gear	I.D.	47.009–47.025 (1.8507–1.8514)	47.08 (1.854)
	End play, after tightening with specified torque	0.05–0.12 (0.002–0.005)	Adjust with a collar.
	Thickness	B17A1 engine B18A1 engine	28.8 (1.13) 34.5 (1.36)

(cont'd)

**Manual Transmission — Section 13 (cont'd)**

Unit of length: mm (in)

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Spacer collar of countershaft 2nd gear	I.D.	36.521–36.531 (1.4378–1.4382)	36.541 (1.4386)
	O.D.	41.989–42.000 (1.6531–1.6535)	41.94 (1.651)
	Length	A 29.020–29.040 (1.1425–1.1433)	—
		B 29.070–29.090 (1.1445–1.1453)	—
Spacer collar of mainshaft 4th gear and 5th gear	I.D.	31.002–31.012 (1.2205–1.2209)	31.06 (1.223)
	O.D.	36.989–37.000 (1.4563–1.4567)	36.94 (1.454)
	Length	A 56.450–56.550 (2.2224–2.2264)	—
		B 26.030–26.080 (1.0248–1.0268)	—
Reverse idler gear	I.D. Gear-to-reverse shaft clearance	20.016–20.043 (0.7880–0.7891) 0.036–0.084 (0.0014–0.0033)	— 0.16 (0.006)
Synchro ring	Ring-to-gear clearance (ring pushed against gear)	0.85–1.10 (0.033–0.043)	0.40 (0.016)
Dual cone synchro ring	Clearance (ring pushed against gear) Outer synchro ring-to-gear Inner synchro ring-to-gear Outer synchro ring-to-synchro cone	0.95–1.68 (0.037–0.066) 0.5–1.0 (0.02–0.04) 0.5–1.0 (0.02–0.04)	0.6 (0.02) 0.3 (0.01) 0.3 (0.01)
Shift fork	Thickness of synchro sleeve contact area Fork-to-synchro sleeve clearance	7.40–7.50 (0.291–0.295) 0.45–0.65 (0.018–0.026)	— 1.00 (0.039)
Reverse shift fork	Groove width of reverse idle gear contact area	13.0–13.3 (0.51–0.52)	—
	Fork-to-reverse idler gear clearance	0.5–1.1 (0.20–0.43)	1.8 (0.07)
	"L" Groove width at reverse gear side	7.05–7.25 (0.278–0.285)	—
	at 5th gear side	7.40–7.70 (0.291–0.303)	—
	Fork-to-5th/reverse shift shaft clearance at reverse gear side	0.05–0.45 (0.002–0.018)	—
	at 5th gear side	0.40–0.90 (0.016–0.035)	—
Change piece	Groove width of shift arm contact area	11.80–12.00 (0.465–0.472)	—
	Change piece-to-shift arm clearance	0.05–0.35 (0.002–0.014)	0.80 (0.031)
Shift piece	Groove width of shift arm contact area	8.10–8.20 (0.319–0.323)	—
	Piece-to-shift arm clearance	0.10–0.30 (0.004–0.012)	0.60 (0.024)
	I.D.	14.000–14.068 (0.5512–0.5539)	—
	Piece-to-shaft clearance	0.011–0.092 (0.0004–0.0036)	0.15 (0.006)
	Diameter of shift fork contact area	11.90–12.00 (0.469–0.472)	—
	Piece-to-shift fork clearance	0.20–0.50 (0.008–0.020)	0.80 (0.031)
Select arm	Diameter of change piece contact area	11.90–12.00 (0.469–0.472)	—
	Arm-to-change piece clearance	0.05–0.25 (0.002–0.010)	0.50 (0.020)
	Groove width of interlock contact area	10.05–10.15 (0.396–0.400)	—
	Arm-to-interlock clearance	0.05–0.25 (0.002–0.010)	0.50 (0.020)

# Standards and Service Limits

## Automatic Transmission — Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission fluid	Capacity $\ell$ (US qt, Imp qt)	6.3 (6.7, 5.5) for overhaul 3.0 (3.2, 2.6) for fluid change	
Hydraulic pressure  *PB: throttle B pressure	Line pressure at 2,000 rpm kPa (kg/cm <sup>2</sup> , psi)	500 (5.0, 71) Throttle valve full-closed  830 (8.3, 118) *PB—50 mmHg or more	450 (4.5, 64) Throttle valve full-closed  730 (7.3, 104) *PB—50 mmHg or more
	1st, 2nd, 3rd, 4th clutch pressure at 2,000 rpm kPa (kg/cm <sup>2</sup> , psi)	500 (5.0, 71) Throttle valve full-closed  840 (8.4, 119) *PB—50 mmHg or more	450 (4.5, 64) Throttle valve full-closed  740 (7.4, 105) *PB—50 mmHg or more
	2nd clutch pressure at 2,000 rpm in <span style="border: 1px solid black; padding: 0 2px;">2</span> kPa (kg/cm <sup>2</sup> , psi)	500 (5.0, 71) Throttle valve full-closed  830 (8.3, 118) *PB—50 mmHg or more	450 (4.5, 64) Throttle valve full-closed  730 (7.3, 104) *PB—50 mmHg or more
	Throttle B pressure Full-closed kPa (kg/cm <sup>2</sup> , psi) Full-open	0 780—830 (7.8—8.3, 111—118)	— 730 (7.3, 104)
	Modulator pressure kPa (kg/cm <sup>2</sup> , psi)	520—560 (5.2—5.6, 74—80)	450 (4.5, 64)
Stall speed	rpm	2,450—2,750	—
Clutch	Clutch initial clearance 1st	0.65—0.85 (0.026—0.033)	—
	2nd	0.50—0.70 (0.020—0.028)	—
	3rd, 4th	0.40—0.60 (0.016—0.024)	—
	Clutch return spring free length Low, 3rd, 4th	31.0 (1.22)	29.0 (1.14)
	Clutch disc thickness	1.88—2.00 (0.074—0.079)	Until grooves worn out
	Clutch plate thickness	1.95—2.05 (0.077—0.079)	Discoloration
	Clutch end plate thickness 1st, 3rd, 4th	2.05—2.10 (0.081—0.083)	Discoloration
	Mark 1	2.15—2.20 (0.085—0.087)	
	Mark 2	2.25—2.30 (0.089—0.091)	
	Mark 3	2.35—2.40 (0.093—0.095)	
	Mark 4	2.45—2.50 (0.096—0.098)	
	Mark 5	2.55—2.60 (0.100—0.102)	
	Mark 6	2.65—2.70 (0.104—0.106)	
	Mark 7	2.75—2.80 (0.108—0.110)	
	Mark 8	2.85—2.90 (0.112—0.114)	
	Mark 9	2.95—3.00 (0.116—0.118)	
	Mark 10	3.05—3.10 (0.120—0.122)	
	Mark 11	3.15—3.20 (0.124—0.126)	
	Mark 12	3.25—3.30 (0.128—0.130)	
	Mark 13	3.35—3.40 (0.132—0.134)	
	Mark 14	2.05—2.10 (0.081—0.083)	
	Mark 1	2.15—2.20 (0.085—0.087)	
	Mark 2	2.25—2.30 (0.089—0.091)	
	Mark 3	2.35—2.40 (0.093—0.095)	
	Mark 4	2.45—2.50 (0.096—0.098)	
	Mark 5	2.55—2.60 (0.100—0.102)	
	Mark 6	2.65—2.70 (0.104—0.106)	
	Mark 7	2.75—2.80 (0.108—0.110)	
	Mark 8	2.85—2.90 (0.112—0.114)	
	Mark 9		Discoloration
Valve body	Stator camshaft needle bearing contact area I.D. (torque converter side)	27.000—27.021 (1.0630—1.0638)	Wear or damage
	Stator camshaft needle bearing contact area I.D. (oil pump side)	29.000—29.013 (1.1417—1.1422)	—
	Oil pump driven gear I.D.	14.016—14.034 (0.5518—0.5525)	Wear or damage
	Oil pump shaft O.D.	13.980—13.990 (0.5504—0.5508)	—
	Oil pump gear side clearance	0.03—0.05 (0.001—0.002)	0.07 (0.003)
	Oil pump gear-to-body clearance Drive Driven	0.210—0.265 (0.0083—0.0104) 0.035—0.063 (0.0014—0.0025)	—
Regulator valve body	Sealing ring contact area diameter	35.000—35.025 (1.3780—1.3789)	35.050 (1.3799)
2nd accumulator body	Sealing ring contact area diameter	27.000—27.025 (1.0630—1.0640)	27.050 (1.0650)
Shifting device and parking brake control	Reverse shift fork thickness	5.90—6.00 (0.232—0.236)	5.40 (0.213)
	Parking brake ratchet pawl	—	Wear or other defect
	Parking gear	—	Wear or other defect
Servo body	Shift fork shaft I.D. A	14.000—14.005 (0.5512—0.5514)	—
	B	14.006—14.010 (0.5514—0.5516)	—
	C	14.011—14.015 (0.5516—0.5518)	—
	Shift fork shaft valve bore I.D.	37.000—37.039 (1.4567—1.4582)	37.045 (1.4585)

(cont'd)

# Automatic Transmission — Section 14 (cont'd)

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission	Diameter of needle bearing contact area		Wear or damage ↑
	On mainshaft and stator shaft	22.980—22.993 (0.9047—0.9052)	
	On mainshaft 4th gear collar	31.975—31.991 (1.2589—1.2595)	
	On mainshaft 1st gear collar	30.975—30.991 (1.2195—1.2201)	
	On countershaft (right side)	36.005—36.015 (1.4175—1.4179)	
	On countershaft 3rd gear distance collar	40.975—40.991 (1.6132—1.6138)	
	On countershaft selector hub	31.975—31.991 (1.2589—1.2595)	
	On countershaft reverse gear collar	31.975—31.991 (1.2589—1.2595)	
	On countershaft 1st gear collar	31.975—31.991 (1.2589—1.2595)	
	On secondary shaft 2nd drive gear	31.975—31.991 (1.2589—1.2595)	
	On reverse idle gear	13.990—14.000 (0.5508—0.5512)	
	Reverse idler gear shaft holder I.D.	14.416—14.434 (0.5676—0.5683)	
	Mainshaft 1st gear I.D.	35.000—35.016 (1.3780—1.3786)	
	4th gear I.D.	38.000—38.016 (1.4961—1.4967)	
	Countershaft 4th gear I.D.	38.000—38.016 (1.4961—1.4967)	
	3rd gear I.D.	49.000—49.016 (1.9291—1.9298)	
	1st gear I.D.	38.000—38.016 (1.4961—1.4967)	
	Reverse gear I.D.	38.000—38.016 (1.4961—1.4967)	
	2nd drive gear I.D.	38.000—38.016 (1.4961—1.4967)	
	Reverse idler gear I.D.	18.006—18.017 (0.7089—0.7093)	
	Thrust washer thickness		Wear or damage ↓ 1.40 (0.551) Wear or damage Wear or damage — Wear or damage
	Mainshaft 4th gear	4.45—4.55 (0.175—0.179)	
	Mainshaft right side ball bearing contact area	2.95—3.05 (0.116—0.120)	
	Mainshaft 1st gear right side	1.45—1.50 (0.057—0.059)	
	Mainshaft 1st gear left side	2.43—2.50 (0.096—0.098)	
	Secondary shaft 2nd hub right side	2.45—2.55 (0.096—0.100)	
	Mainshaft 4th gear Collar length	50.50—50.55 (1.988—1.990)	
	Mainshaft 1st gear Collar length	24.50—24.55 (0.9645—0.9665)	
	Collar flange thickness	2.50—2.60 (0.0984—0.1024)	
	Countershaft distance collar 29 mm		
	Collar length		
		1 23.08—23.10 (0.9087—0.9094)	
		2 23.10—23.12 (0.9094—0.9102)	
		3 23.12—23.14 (0.9102—0.9110)	
		4 23.14—23.16 (0.9110—0.9118)	
		5 23.16—23.18 (0.9118—0.9126)	
		6 23.18—23.20 (0.9126—0.9134)	
		7 23.20—23.22 (0.9134—0.9142)	
		8 23.22—23.24 (0.9142—0.9150)	
		9 23.24—23.26 (0.9150—0.9157)	
		10 23.26—23.28 (0.9157—0.9165)	
		11 23.28—23.30 (0.9165—0.9170)	
		12 23.30—23.32 (0.9170—0.9181)	
		13 23.32—23.34 (0.9181—0.9189)	
		14 23.34—23.36 (0.9189—0.9197)	
		15 23.36—23.38 (0.9197—0.9205)	
		16 23.38—23.40 (0.9205—0.9213)	
	Secondary shaft		— — — — — — — — — — — — — — — —
	Cotter 26 mm thickness		
		1 1.97—2.00 (0.078—0.079)	
		2 2.02—2.05 (0.080—0.081)	
		3 2.07—2.10 (0.081—0.083)	
		4 2.12—2.15 (0.083—0.085)	
	Countershaft 3rd gear distance cooler		
	Collar length		
		1 25.955—25.970 (1.0218—1.0224)	
		2 25.970—25.985 (1.0224—1.0230)	
		3 25.985—26.000 (1.0230—1.0236)	
		4 26.000—26.015 (1.0236—1.0242)	
		5 26.015—26.030 (1.0242—1.0248)	
		6 26.030—26.045 (1.0248—1.0254)	
	Countershaft reverse gear		
	Collar length	12.0—12.1 (0.4724—0.4764)	
	Collar flange thickness	2.40—2.60 (0.0945—0.1024)	
	Countershaft 1st gear		Wear or damage — Wear or damage
	Collar length	12.0—12.1 (0.4724—0.4764)	
	Collar flange thickness	2.40—2.60 (0.0945—0.1024)	

# Standards and Service Limits

## Automatic Transmission — Section 14

		MEASUREMENT	STANDARD (NEW)		SERVICE LIMIT	
Transmission (cont'd)	Secondary shaft distance collar 25 mm					
	Collar length	1	28.82—28.85 (1.1346—1.1358)		—	
		2	28.87—28.90 (1.1366—1.1378)		—	
		3	28.92—28.95 (1.1386—1.1398)		—	
		4	28.97—29.00 (1.1405—1.1417)		—	
		5	29.02—29.05 (1.1425—1.1437)		—	
		6	29.07—29.10 (1.1445—1.1457)		—	
		7	29.12—29.15 (1.1465—1.1476)		—	
		8	29.17—29.20 (1.1484—1.1496)		—	
		9	29.22—29.25 (1.1504—1.1516)		—	
		10	29.27—29.30 (1.1524—1.1535)		—	
		Diameter of one-way clutch contact area of countershaft 1st gear		83.339—83.365 (3.2811—3.2821)	Wear or damage	
		Diameter of one-way clutch contact area of parking gear		66.685—66.695 (2.6254—2.6258)	Wear or damage	
		Mainshaft feed pipe O.D.		6.97—6.98 (0.2744—0.2748)	6.95 (0.2736)	
		Countershaft feed pipe O.D.		7.97—7.98 (0.3138—0.3142)	7.95 (0.3130)	
		Mainshaft sealing ring 35 mm thickness		1.980—1.995 (0.0780—0.0785)	1.800 (0.0709)	
		29 mm thickness		1.980—1.995 (0.0780—0.0785)	1.800 (0.0709)	
		Secondary shaft sealing ring 27 mm thickness		1.980—1.995 (0.0780—0.0785)	1.800 (0.0709)	
		Mainshaft bushing I.D. A		6.018—6.030 (0.2369—0.2374)	6.045 (0.2380)	
		B		9.000—9.015 (0.3543—0.3549)	9.030 (0.3555)	
		Countershaft bushing I.D.		8.000—8.015 (0.3150—0.3156)	8.030 (0.3161)	
		Mainshaft sealing ring groove width		2.025—2.060 (0.0797—0.0811)	2.080 (0.0819)	
		Secondary shaft sealing ring groove width		2.025—2.060 (0.0797—0.0811)	2.080 (0.0819)	
		End play				
		Mainshaft 4th gear		0.10—0.22 (0.0039—0.0087)	—	
		Mainshaft 1st gear		0.08—0.24 (0.0031—0.0094)	—	
		Countershaft 3rd gear		0—0.03 (0—0.0012)	—	
		Countershaft 2nd gear		0—0.04 (0—0.0016)	—	
		Countershaft 4th gear		0.05—0.17 (0.0020—0.0067)	—	
		Countershaft reverse gear		0.10—0.25 (0.039—0.0098)	—	
		Secondary shaft 2nd drive gear		0—0.08 (0—0.0031)	—	
		2nd clutch		0—0.08 (0—0.0031)	—	
		Reverse idler gear		0.06—0.18 (0.0020—0.0071)	—	
				STANDARD (NEW)		
	MEASUREMENT		WIRE DIA.	O.D.	FREE LENGTH	NO. of COILS
Springs	Regulator valve spring A		1.8 (0.071)	14.7 (0.5887)	80.2 (3.158)	16.5
	B		1.8 (0.071)	6.0 (0.236) I.D.	44.0 (1.732)	11.0
	Stator reaction spring		6.0 (0.236)	26.4 (1.039) I.D.	30.3 (1.1930)	2.0
	Torque converter check valve spring		1.1 (0.043)	8.4 (0.331)	36.4 (1.433)	12.0
	Relief valve spring		1.0 (0.039)	8.4 (0.331)	52.0 (2.047)	23.0
	Cooler relief valve spring		1.1 (0.043)	8.4 (0.331)	46.8 (1.8430)	17.0
	2nd orifice control spring		0.8 (0.032)	6.6 (0.260)	54.1 (2.130)	32.5
	Orifice spring		0.8 (0.032)	6.1 (0.240)	41.8 (1.646)	22.4
	4th exhaust spring		0.8 (0.032)	5.6 (0.221)	54.2 (2.134)	32.0
	1-2 shift spring		0.9 (0.035)	8.6 (0.339)	40.4 (1.591)	14.5
	3-4 shift spring/2-3 shift spring		0.8 (0.032)	7.6 (0.299)	50.8 (2.000)	16.0
	1st accumulator spring		3.0 (0.118)	18.6 (0.732)	80.7 (3.177)	14.8
	4th accumulator spring		2.7 (0.106)	18.4 (0.724)	78.5 (3.091)	8.5
	2nd accumulator spring		3.3 (0.130)	20.0 (0.787)	77.5 (3.051)	10.9
	3rd accumulator spring		2.6 (0.102)	17.0 (0.669)	80.2 (3.158)	13.7
	L/C shift spring		0.9 (0.035)	7.6 (0.299)	73.7 (2.902)	32.0
	L/C timing spring		0.9 (0.035)	6.6 (0.260)	66.7 (2.626)	34.0
	L/C control spring B, C, D		0.7 (0.028)	6.6 (0.260)	*38.0 (1.496)	14.1
	Servo control valve spring		1.0 (0.039)	6.6 (0.260)	74.7 (2.941)	36.4
	Modulator valve spring		1.5 (0.059)	9.4 (0.370)	30.6 (1.205)	9.9
	3rd kick-down spring		1.0 (0.039)	6.6 (0.260)	55.4 (2.181)	27.0
	2nd kick-down spring		1.2 (0.047)	6.1 (0.240)	31.1 (1.224)	15.7

\* Standard value for selective fitting

Unit of length: mm (in)

## Differential (Manual Transmission) — Section 15

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Final driven gear	Backlash	0.085–0.142 (0.003–0.006)	0.200 (0.008)
Differential carrier	Pinion shaft bore diameter	18.000–18.018 (0.7087–0.7093)	—
	Carrier-to-pinion shaft clearance	0.017–0.045 (0.001–0.002)	0.100 (0.004)
	Driveshaft bore diameter	28.000–28.021 (1.102–1.103)	—
	Carrier-to-driveshaft clearance	0.020–0.062 (0.001–0.002)	0.120 (0.005)
	Carrier-to-intermediate shaft clearance	0.050–0.087 (0.002–0.003)	0.140 (0.006)
	Side clearance	0.10 (0.004) max.	Adjust with a shim
Differential pinion gear	Backlash	0.05–0.15 (0.002–0.006)	—
	Pinion gear bore diameter	14.042–18.066 (0.710–0.711)	—
	Pinion gear-to-pinion shaft clearance	0.059–0.095 (0.002–0.004)	0.150 (0.006)

## Differential (Automatic Transmission) — Section 15

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Final driven gear	Backlash	0.085–0.142 (0.003–0.006)	0.200 (0.008)
Differential carrier	Pinion shaft bore diameter	18.000–18.018 (0.7087–0.7094)	—
	Carrier-to-pinion shaft clearance	0.017–0.047 (0.001–0.002)	0.100 (0.004)
	Driveshaft bore diameter	28.005–28.025 (1.1026–1.1033)	—
	Carrier-to-driveshaft clearance	0.025–0.066 (0.001–0.003)	0.120 (0.005)
	Carrier-to-intermediate shaft clearance	0.050–0.087 (0.002–0.003)	0.140 (0.006)
	Side clearance	below 0.15 (0.006)	Adjust with a shim
Differential pinion gear	Backlash	0.08–0.15 (0.03–0.006)	Adjust with a washer
	Pinion gear bore diameter	18.042–18.066 (0.710–0.711)	—
	Pinion gear-to-pinion shaft clearance	0.059–0.095 (0.002–0.004)	0.150 (0.006)

## Power Steering — Section 17

	MEASUREMENT	STANDARD (NEW)
Power steering fluid	Capacity ℓ (US qt, Imp qt)	0.50 (0.53, 0.44)
	Reservoir capacity System capacity	1.40 (1.48, 1.23)
Power steering belt*	Deflection when 100 N (10 kg, 22 lbs) between the pulleys	9.5–11.5 (0.37–0.45) with used belt 6.0–8.0 (0.23–0.31) with new belt
	Belt tension N (kg, lb) Measured with belt tension gauge	350–450 (35–45, 77–99) with used belt 600–800 (60–80, 132–176) with new belt
Power steering pump	Pump pressure with valve closed (Oil temperature/speed: above 40°C (104 °F)/idle. Do not run for more than 5 seconds). kPa (kg/cm <sup>2</sup> , psi)	8,000–9,000 (80–90, 1,138–1,280)
Steering wheel	Play at wheel circumference	0–10 (0–0.4)
Gearbox	Pinion starting torque	N·m (kg-m, lb-ft)
	Rack guide screw tightening torque	N·m (kg-m, lb-ft)
	Back-off angle of rack guide screw (from tightened position)	20° +5° 0

\* When using a new belt, adjust deflection or tension to new belt values.

Run the engine for 5 minutes then turn it off. Readjust deflection or tension to used belt values.

# Standards and Service Limits

## Suspension — Section 18

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Wheel alignment	Total toe	Front	$0 \pm 2.0$ (0 $\pm$ 0.08)	—
		Rear	$\text{IN } 2.0 \pm 1.0$ (0.08 $\pm$ 0.04)	—
	Camber	Front	$0^\circ \pm 1^\circ$	—
		Rear	$-0^\circ 40' \pm 1^\circ$	—
	Caster	Front	$1^\circ 30' \pm 1^\circ$	—
Wheel turning angle	Wheel turning angle	Inward wheel	$40^\circ 30' \pm 2^\circ$	—
		Outward wheel	$32^\circ 00'$	—
Wheel	Rim runout	Steel	0–1.0 (0–0.04)	2.0 (0.08)
		Aluminum	0–1.0 (0–0.04)	1.5 (0.06)
		Axial	0–0.7 (0–0.03)	2.0 (0.08)
		Radial	0–0.7 (0–0.03)	1.5 (0.06)
Wheel bearing	End play	Front	0–0.05 (0–0.002)	—
		Rear	0–0.05 (0–0.002)	—

## Brakes — Section 19

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Parking brake lever	Play in stroke 200 N (20 kg, 44 lbs)		To be locked when pulled 6–10 notches	—
Foot brake pedal	Free play		1–5 (1/16–13/64)	—
	Pedal height from floor	M/T	155 (6.1)	—
		A/T	160 (6.3)	—
Master cylinder	Piston-to-push rod clearance		0–0.4 (0–0.02)	—
Brake disc	Disc thickness	Front	21.0 (0.83)	19.0 (0.75)
		Rear	9.0 (0.35)	8.0 (0.31)
	Disc runout	Front	—	0.10 (0.004)
		Rear	—	0.15 (0.006)
	Disc parallelism	Front and rear	—	0.015 (0.0006)
	Pad thickness	Front	11.0 (0.43)	1.6 (0.06)
		Rear	7.5 (0.30)	1.6 (0.06)

## Air Conditioning — Section 22

	MEASUREMENT		STANDARD (NEW)
Air conditioning system	Lubricant capacity cc (fl oz, Imp oz)	Condenser	10 (0.34, 0.28)
		Evaporator	30 (1.00, 0.84)
		Line or hose	10 (0.34, 0.28)
		Reservoir	10 (0.34, 0.28)
Compressor	Lubricant capacity cc (US oz, Imp oz)		60–100 (2.03–3.38, 1.96, 2.82)
	Stator coil resistance at 20°C (68°F) $\Omega$		3.4–3.8
	Pulley-to-pressure plate clearance		0.35–0.65 (0.014–0.026)
Compressor belt*	Deflection with 100 N (10 kg, 22 lbs) between the pulleys		7.0–9.0 (0.28–0.35) with used belt
			4.5–6.5 (0.18–0.26) with new belt
	Belt tension N (kg, lbs)		350–500 (35–50, 77–110) with used belt
	Measured with belt tension gauge		550–750 (55–75, 121–165) with new belt

\* When using a new belt, adjust deflection or tension to new belt values.

Run the engine for 5 minutes then turn it off. Readjust deflection or tension to used belt values.



# Electrical — Section 23

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Ignition coil	Rated voltage V	12	
	Primary winding resistance $\Omega$	0.6–0.8	
	Secondary winding resistance k $\Omega$	12.8–19.2	
Ignition wire	Resistance k $\Omega$ at 20°C (68 °F)	below 25	
Spark Plug	Type	See Section 23	
	Gap	1.0–1.1 (0.039–0.043)* <sup>1</sup>	—
		1.0–1.1 (0.039–0.043)* <sup>2</sup>	1.3 (0.051)* <sup>2</sup>
Ignition timing	At idling ° BTDC	M/T: 16 ± 2 (Red) A/T: 16 ± 2 (Red)	
Alternator belt*	Deflection with 100 N (10 kg, 22 lbs) between pulleys	7.0–10.5 (0.28–0.41) with used belt 5.0–7.0 (0.20–0.27) with new belt	
	Belt tension N (kg, lb)	350–500 (35–50, 77–110) with used belt	
	Measured with belt tension gauge	700–900 (70–90, 154–198) with new belt	
	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Alternator	Output 13.5 V at hot A	80	—
	Coil resistance (rotor) $\Omega$	2.7–3.1	—
	Slip ring O.D.	14.2–14.4 (0.56–0.57)	12.8 (0.50)
	Brush length	10.5 (0.41)	5.5 (0.22)
	Brush spring tension g (oz)	330 (11.6)	—
Starting motor	Output kW	1.4	—
	Mica depth	0.5–0.8 (0.02–0.03)	0.2 (0.01)
	Commutator runout	0–0.02 (0–0.001)	0.05 (0.002)
	Commutator O.D.	29.9–30.0 (1.177–1.181)	29.0 (1.142)
	Brush length	15.0–15.5 (0.59–0.61)	10.0 (0.39)
	Brush spring tension (new) N (kg, lb)	17–24 (1.7–2.4, 3.7–5.3)	—

\* When using a new belt, adjust deflection or tension to new belt values.

Run the engine for 5 minutes then turn it off. Readjust deflection or tension to used belt values.

\*1: B18A1 engine

\*2: B17A1 engine

# Design Specifications

	ITEMS		METRIC	ENGLISH	NOTES
DIMENSIONS	Overall Length	2D-Hatchback	4,392 mm	172.9 in	including door molding
		4D-Sedan	4,484 mm	176.5 in	
	Overall Width		1,714 mm	67.5 in	
	Overall Height	2D-Hatchback	1,325 mm	52.2 in	
		4D-Sedan	1,341 mm	52.8 in	
	Wheelbase	2D-Hatchback	2,550 mm	100.4 in	
		4D-Sedan	2,600 mm	102.4 in	
	Track F/R		1,475/1,475 mm	58.1/58.1 in	
Seating Capacity		Five (2/3)			
Overhang F/R	2D-Hatchback	882/960 mm	34.7/37.8 in	including bumper	
	4D-Sedan	882/1,002 mm	34.7/39.4 in	including bumper	
WEIGHT (U.S. Model)	Gross Vehicle Weight Rating (MVSS)				
	LS, LSS (2D-Hatchback only)		—	3,635 lbs	
	RS		—	3,635 lbs	
	GS		—	3,680 lbs	
	GSR (2D-Hatchback only)		—	3,680 lbs	
WEIGHT (Canada Model)	Gross Vehicle Weight Rating (MVSS)				
	LS		1,650 kg	—	
	RS, RS SE (4D-Sedan only)		1,650 kg	—	
	GS		1,670 kg	—	
	GSR (4D-Sedan only)		1,670 kg	—	
ENGINE	Type		Water-cooled, 4-stroke DOHC*1 Water-cooled, 4-stroke DOHC VTEC*2		
	Cylinder Arrangement		4-cylinders Inline, transverse		
	Bore and Stroke		81.0 × 89.0 mm*1	3.19 × 3.50 in*1	
			81.0 × 81.4 mm*2	3.19 × 3.20 in*2	
	Displacement		1,834 cm <sup>3</sup> (cc)*1	111.9 cu in*1	
			1,678 cm <sup>3</sup> (cc)*2	102.4 cu in*2	
	Compression Ratio		9.2 : 1*1, 9.7 : 1*2		
	Valve Train		4 valves per cylinder, double overhead camshafts		
	Lubrication System		Forced and wet sump, trochoid pump		
	Fuel Required		Unleaded gasoline with Pump Octane Number of 86 or higher*1 Premium Unleaded gasoline with Pump Octane Number of 91 or higher*2		

\*1: B18A1 engine, \*2: B17A1 engine

Unit of length: mm (in)

	ITEMS		METRIC	ENGLISH	NOTES
<b>STARTER</b>	Type		Gear reduction		
	Normal Output		1.4 kW		
	Nominal Voltage		12 V		
	Hour Rating		30 sec		
	Direction of Rotation		Clockwise as viewed from gear end		
	Weight		4.7 kg	10.4 lbs	
<b>TRANSMISSION</b>	Clutch	M/T	Dry, single plate, diaphragm spring		
		A/T	Torque converter		
	Clutch Facing Area	M/T	203 cm <sup>2</sup>	31.5 sq-in.	
	Transmission	M/T	5-speed forward, synchromesh, 1 reverse		
		A/T	4-speed forward with lock-up clutch, 1 reverse		
	Gear Ratio		Manual	Automatic	
	Primary Reduction		1.000	1.000	
	Gear	1st	3,230* <sup>1</sup>	3,307* <sup>2</sup>	2.647
		2nd	1,900* <sup>1</sup>	2,105* <sup>2</sup>	1.483
		3rd	1,269* <sup>1</sup>	1,459* <sup>2</sup>	0.974
		4th	0.966* <sup>1</sup>	1,107* <sup>2</sup>	0.725
		5th	0.742* <sup>1</sup>	0.875* <sup>2</sup>	
		Reverse	3.000	1.904	
	Final Reduction		Single helical gear	Single helical gear	
			4.266* <sup>1</sup>	4.400* <sup>2</sup>	4.428
<b>AIR CONDITIONING</b>	Cooling Capacity		4,400 kcal/h	17,459 BTU/h	
	Conditions:				
	Compressor rpm		1,900 rpm		
	Outside Air Temperature		27 °C	80.6 °F	
	Outside Humidity		50 %		
	Condenser Air Temperature		35 °C	95 °F	
	Condenser Air Velocity		4.5 m/sec.	14.8 ft/sec.	
	Blower Capacity (at 13.5 V)		500 m <sup>3</sup> /h	17,660 cu-ft/h	
	Compressor	Manufacturer	NIPPONDENSO		
		Type	Swash-plate		
		Number of Cylinders	10		
		Displacement	155.3 cc/rev.	9.47 cu-in/rev.	
		Max. rpm	7,600 rpm		
		Lubricant/Capacity	60—100 cc	2.03—3.38 US oz (1.69—2.82 Imp oz)	
	Receiver Dryer		—		
	Condenser		Corrugated fin type		
	Evaporator		Corrugated fin type		
	Blower	Type	Sirocco fan		
		Motor Input	12 V—185 W		
		Speed Control	4-speed		
		Max. Capacity	440 m <sup>3</sup> /h	15,541 cu-ft/h	
	Temperature Control		Air-mix type		
	Compressor Clutch	Type	Dry, single plate, V-ribbed belt driven		
		Power Consumption	below 40 W/12 V		
	Refrigerant	Type	R-12		
		Quantity	900—950 g	32.0—34.0 OZ	

\*1: A18A1 engine, \*2: B17A1 engine

# Design Specifications

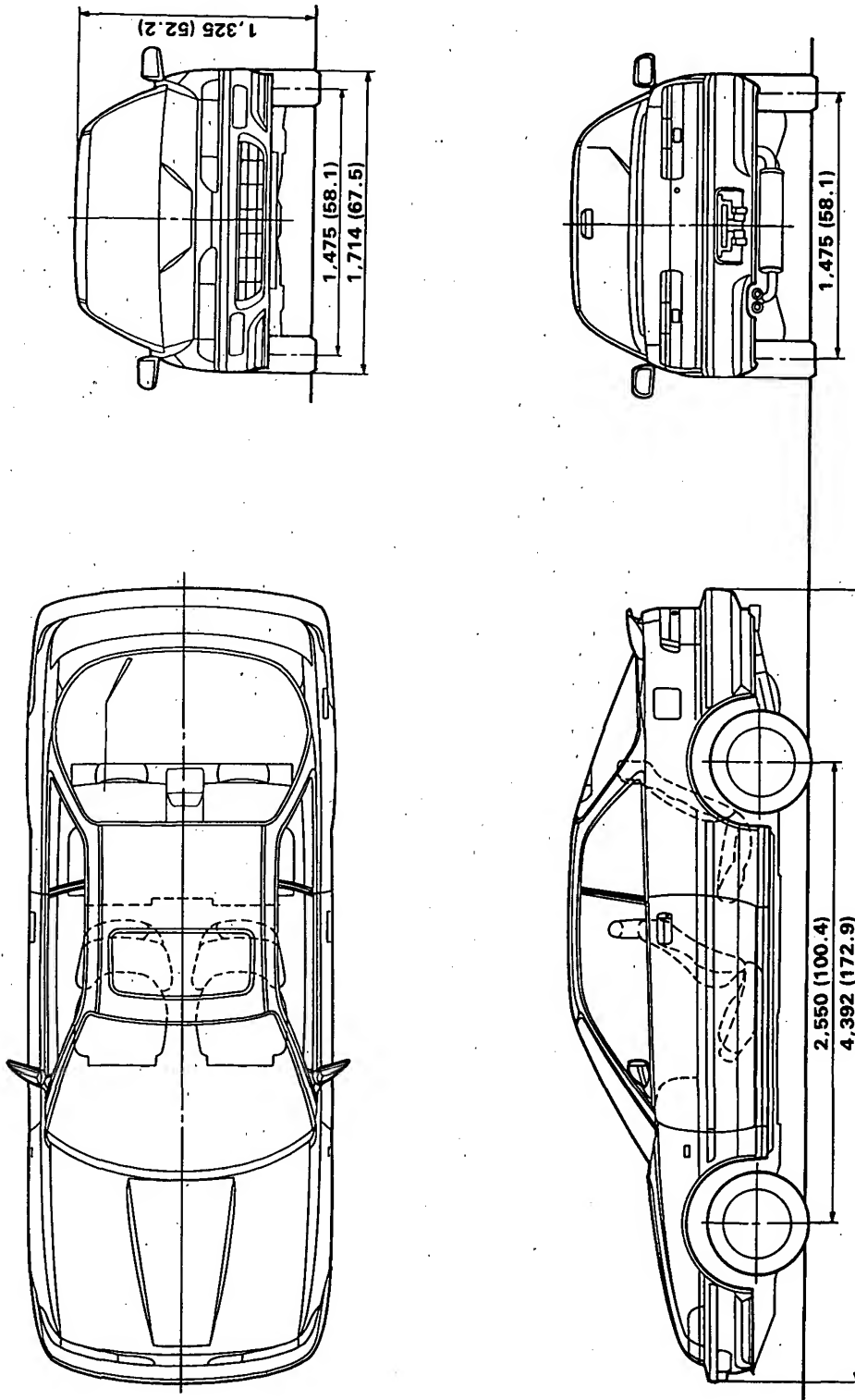
	ITEMS	METRIC	ENGLISH	NOTES
POWER STEERING	Type	Rack and pinion		
	Overall Ratio	17.6		
	Turn, Lock-to-lock	3.5		
	Steering Wheel Diameter	375 mm	14.8 in	
SUSPENSION	Type	Independent double wishbone coil spring		
	Shock Absorber	Telescopic, nitrogen gas-filled		
WHEEL ALIGNMENT	Camber	Front	0° 00'	
		Rear	-0° 40'	
	Caster	Front	1° 30'	
	Toe	Front	0 mm	0 in
		Rear	In 2 mm	In 0.08 in
BRAKE SYSTEM	Type	Front	Power-assisted self-adjusting ventilated disc	
		Rear	Power-assisted self-adjusting solid disc	
	Pad Surface Area	Front	50 cm <sup>2</sup> x 2	7.75 sq. in x 2
		Rear	21 cm <sup>2</sup> x 2	3.26 sq in x 2
	Effective Disc Diameter	Front	214 mm	8.43 in
		Rear	208 mm	8.19 in
TIRES	Size and Pressures	See the tire label attached to the drivers' door jamb.		
ELECTRICAL	Battery	12 V-52 AH/5HR		
	Starter	12 V-1.4 kW		
	Alternator	12 V-80 A		
	Fuses	In the under-dash fuse/relay box	7.5 A, 10 A, 15 A, 20 A, 40 A	
		In the under-hood main fuse box	7.5 A (USA), 10 A, 15 A, 20 A, 30 A, 40 A, 50 A, 80 A	
	Headlights	High/Low	12 V-65/45 W	
	Front Fog Lights		12 V-35 W	
	Front Turn Signal Lights		12 V-32 CP	
	Rear Turn Signal Lights		12 V-32 CP	
	Stop/Taillights		12 V-32/2 CP	
	High Mount Brake Lights		12 V-18 W	
	Front Position Lights		12 V-6 CP (5' W)	
	Side Marker Lights	Front	12 V-5 W	
		Rear	12 V-3 CP	
	Back-up Lights		12 V-32 CP	
	License Plate Lights		12 V-8 W	
	Gauge Lights		12 V-3.4 W, 3.0 W, 1.4 W	
	Indicator Lights		12 V-1.4 W	
	Warning Lights		12 V-1.4 W	
	Interior Light		12 V-5 W	
	Map Light		12 V-5 W	
	Glove Box Light		12 V-3.4 W	
	Luggage Area Light		12 V-3.4 W	
	Illumination and Pilot Lights		12 V-1.4 W, LED unit	
	Heater Illumination Lights		12 V-1.4 W	
	Air Conditioning Switch Pilot Light		12 V-0.84 W	

# Body Specifications

specs

2D-Hatchback

Unit: mm (in)



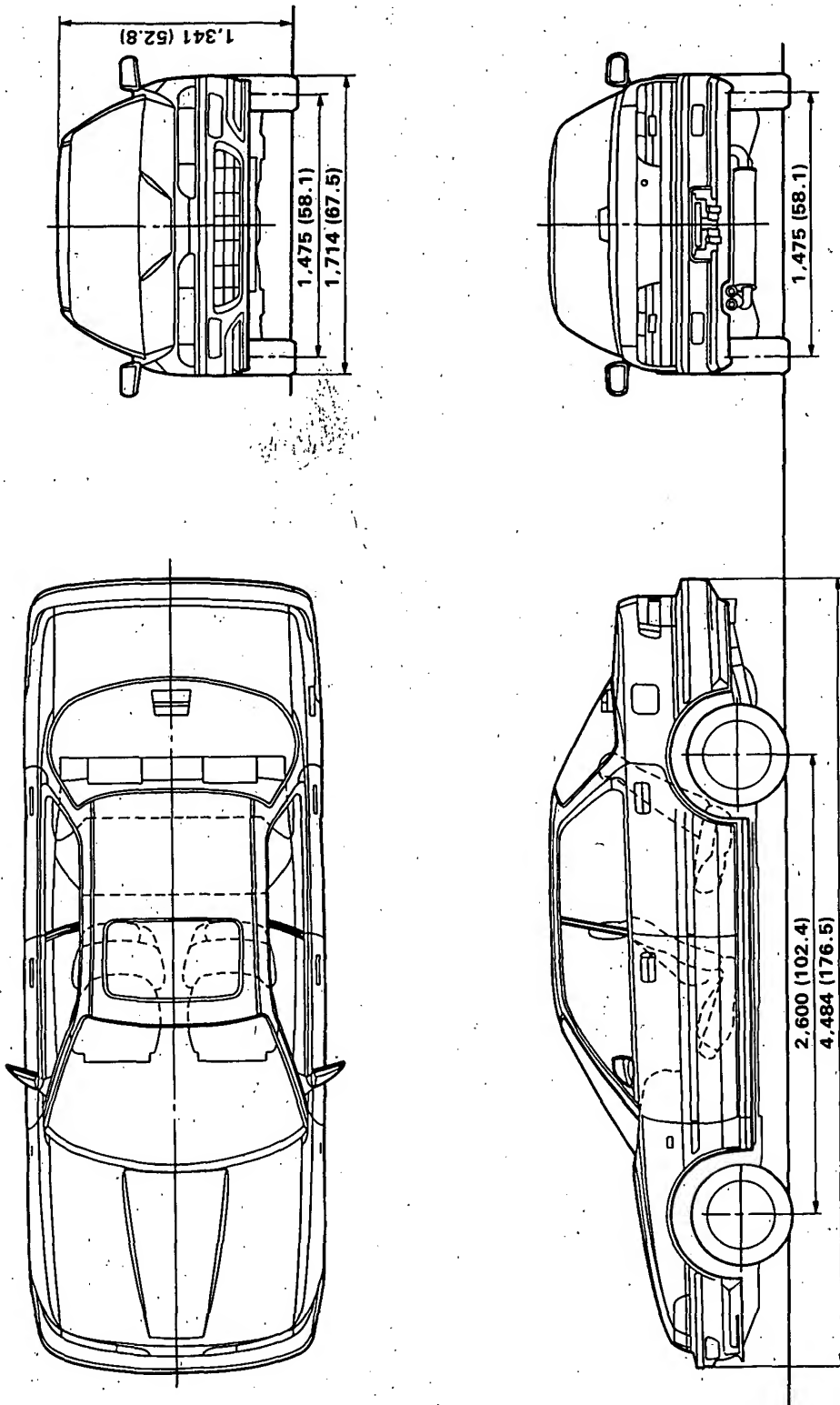
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# Body Specifications

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4D-Sedan

Unit: mm (in)



## Maintenance

Lubrication Points .....	4-2
Maintenance Schedule .....	4-4



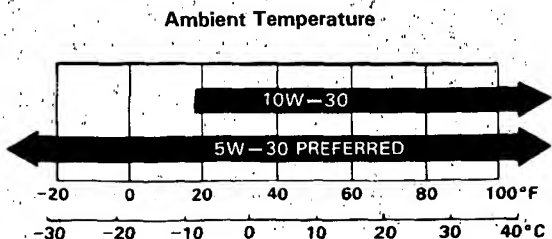
# Lubrication Points

For details of lubrication points and types of lubricants to be applied, refer to the illustrated Index and various work procedures (such as Assembly/Reassembly, Replacement, Overhaul, Inspection, etc) contained in each section.

No.	LUBRICATION POINTS		LUBRICANT
1	Engine		API Service Grade: Use "Energy Conserving II" SG grade oil. B18A1 engine: 5 W-30 preferred. B17A1 engine: 10 W-30 Preferred. SAE Viscosity: See chart below.
2	Transmission	Manual Automatic	API Service Grade: SF or SG. Honda Premium Formula Automatic Transmission Fluid (ATF) or an equivalent. DEXRON® II Automatic transmission fluid.
3	Brake line (ABS line for ABS models)		Brake fluid DOT3 or DOT4.
4	Steering gearbox (Power steering)		Steering grease P/N 08733-B070E
5	Shift lever pivots (Manual transmission)		Silicone grease with molybdenum disulfide
6	Steering ball joints		Multi-purpose grease
7	Suspension ball joints		
8	Steering boots		
9	Steering column bushings		
10	Trunk hinges (4-door sedan)		
11	Select lever (Automatic transmission)		
12	Pedal linkage		
13	Intermediate shaft		
14	Brake master cylinder pushrod		
15	Tailgate hinges (2-door hatchback)		
16	Door hinges upper and lower		
17	Door opening detents		
18	Fuel filler lid		
19	Engine hood hinges		
20	Engine hood latch		
21	Tilt lever		
22	Caliper	Piston seal	Silicone grease
24		Dust seal	
		Caliper pin Piston	
23	Power steering system		Honda power steering fluid -V

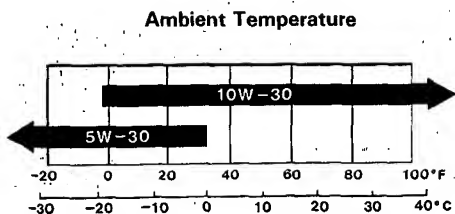
Select the oil for your car according to this chart:

**B18A1 engine:**



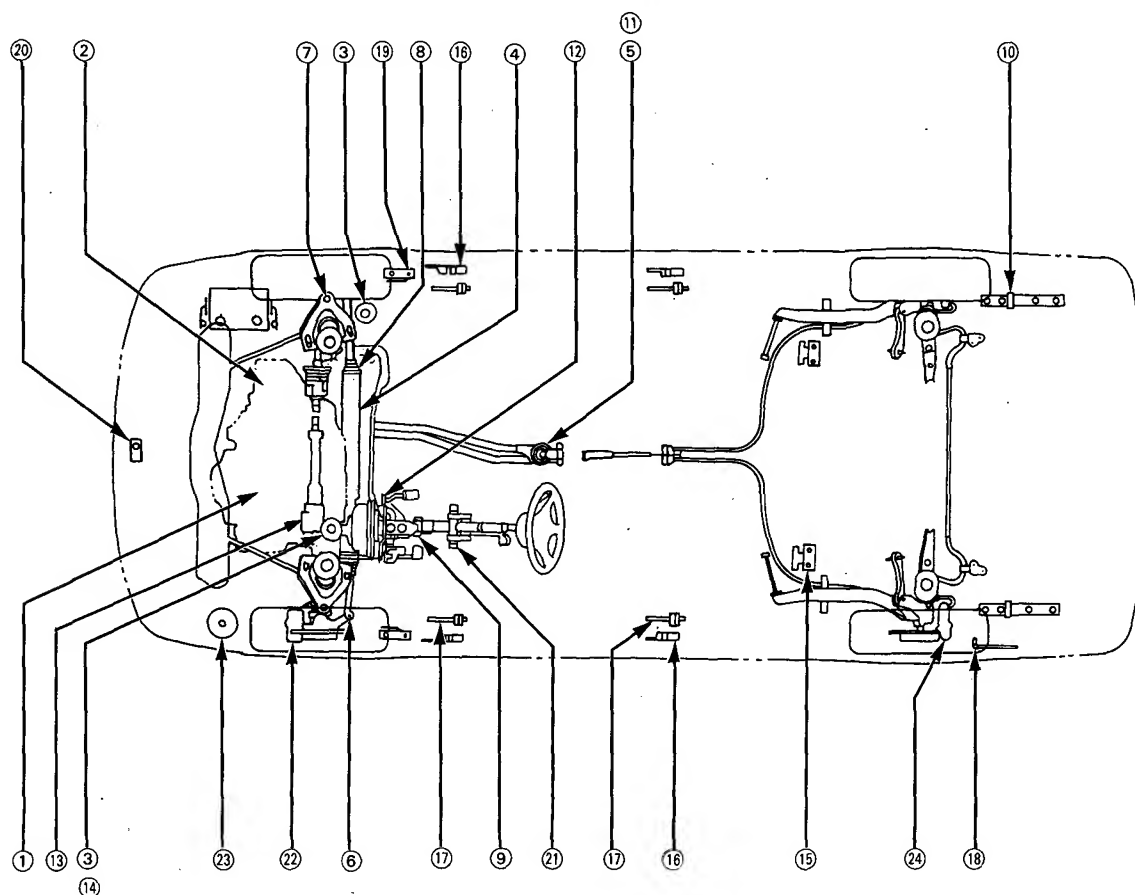
An oil with a viscosity of 5 W-30 is preferred for improved fuel economy and year-round protection in the car. You may use a 10 W-30 oil if the climate in your area is limited to the temperature range shown on the chart.

**B17A1 engine:**



An oil with a viscosity of 10 W-30 is preferred for improved fuel economy and year-round protection in the car. You may use a 5 W-30 oil if the climate in your area is within the temperature range shown on the chart.





# Maintenance Schedule

R—Replace I—Inspect After inspection, clean, adjust, repair or replace if necessary.

Service at the interval listed x 1,000 miles (or km) or after that number of months, whichever comes first:		7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	NOTE	SEC and PAGE
		x 1,000 miles	12	24	36	48	60	72	84	96	108	120	132	144	156		
Maintenance item		months	6	12	18	24	30	36	42	48	54	60	66	72	78	84	
<b>Engine and Transmission</b>																	
<input type="checkbox"/> Air cleaner element (including sub-air cleaner element)																	11-125
Idle speed																	11-103
Positive crankcase ventilation valve																	11-142
Valve clearance (cold)																	6-4 <sup>s</sup> 6-38 <sup>s</sup>
Fuel filter																	11-116
Fuel pipes, hoses, and connections																	11-5
Spark plugs	Except GSR																23-87 <sup>s</sup> 23-88 <sup>s</sup>
	GSR																23-83
Distributor ignition cap and rotor																	23-86
Ignition wires																	8-4
Engine oil																	8-5

<sup>s</sup>: Check oil and coolant level at each fuel stop.

☐: Under severe driving conditions, service these items more often.

<sup>1</sup>: For cars sold in California, this service is recommended only; other areas, it is required.

<sup>2</sup>: Replace every 6 years or 60,000 miles (96,000 km), whichever comes first.

<sup>3</sup>: B18A1 engine

<sup>4</sup>: B17A1 engine



R—Replace I—Inspect After inspection, clean, adjust, repair or replace if necessary.

Service at the interval listed x 1,000 miles (or km) or after that number of months, whichever comes first.																
Maintenance item	NOTE															
	x 1,000 miles	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	SEC and PAGE
Engine and Transmission	x 1,000 km	12	24	36	48	60	72	84	96	108	120	132	144	156	168	
	months	6	12	18	24	30	36	42	48	54	60	66	72	78	84	
Alternator drive belt					I				I				I			23-101
Cooling system hoses and connections					I <sup>1</sup>				I <sup>1</sup>				I <sup>1</sup>			10-2
• Engine coolant							R				R				R <sup>3</sup>	10-3
Timing belt																Capacity for change: Manual transmission: 5.1 l (5.4 US qt, 4.5 Imp qt) <sup>5</sup> 5.0 l (5.3 US qt, 4.4 Imp qt) <sup>5</sup> Automatic transmission: 4.9 l (5.2 US qt, 4.3 Imp qt) Check specific gravity for freezing point.
Water pump													R <sup>4</sup>			6-24 <sup>5</sup> 6-66 <sup>5</sup>
Three way catalytic converter heat shield									I				I			10-7
Exhaust pipe (before catalytic converter)					I <sup>1</sup>				I <sup>1</sup>				I <sup>1</sup>			11-134
Exhaust pipe and muffler (after catalytic converter)			I		I		I		I		I		I		I	9-5
□ Manual transmission oil					R				R				R			9-5
□ Automatic transmission fluid					R				R				R			13-3
□ Clutch release arm travel																3.0 l (3.2 US qt, 2.6 Imp qt) for change HONDA Premium Formula ATF or DEXRON® II ATF
Brakes																14-67
Front brake pad																Free play at arm: 4.0–5.0 mm (0.16–0.29 in)
□ Front brake discs and calipers																12-4, 5
□ Rear brake discs, calipers and pads																Min. thickness: 1.6 mm (0.06 in) Min. thickness: 19 mm (0.75 in) Min. thickness: Discs 8.0 mm (0.32 in) Pads 1.6 mm (0.06 in)

•: Check oil and coolant level at each fuel stop.  
□: Under severe driving conditions, service these items more often.

<sup>1</sup>: For cars sold in California, this service is recommended only: other areas, it is required.  
<sup>3</sup>: Thereafter, replace every 2 years or 30,000 miles (48,000 km), whichever comes first.  
<sup>4</sup>: This service is recommended only.  
<sup>5</sup>: B18A1 engine  
<sup>6</sup>: B17A1 engine

(cont'd)

# Maintenance Schedule (cont'd)

R—Replace I—Inspect After inspection, clean, adjust, repair or replace if necessary.

Service at the interval listed x 1,000 miles (or km) or after that number of months, whichever comes first.																	NOTE	SEC and PAGE
Maintenance item																		
Brakes																		
Brake hoses and lines (including Anti-lock brake system <sup>7)</sup> )																	Check for leaks, damage, interference or twisting.	19-26
Parking brake																	Fully engaged: 6 to 11 clicks..	19-28
Brake fluid (including Anti-lock brake system <sup>7)</sup> )																	Use only DOT3 or DOT 4 fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-10
Anti-lock brake system operation <sup>7)</sup>																		19-31
Anti-lock brake system high pressure hose <sup>7)</sup>																		19-68
Steering, Suspension, Miscellaneous																		
Front wheel alignment																		18-4
Steering operation, tie rod ends, steering gearbox and boots																	Check rack grease and steering linkage. Check the boot for damage or leaking grease.	17-46
□ Power steering system																		17-20
Power steering pump belt																	9.5–11.5 mm (0.37–0.45 in) @ 100 N (10 kg, 22 lbs) tension	17-17
Suspension mounting bolts																	Check tightness of bolts.	18-8, 21

□: Under severe driving conditions, service these items more often.

\*: For LS, GS and GSR

Severe Driving Conditions

Items with an [R] or [I] in the chart will need service more often, if you drive in some severe conditions.

The conditions are:

- A: Repeated short distance driving
- B: Dusty conditions
- C: Severe cold weather
- D: Areas with road salt or other corrosive materials
- E: Rough or muddy roads
- F: Towing a trailer

The services are:

- Replace the air cleaner element (including sub-air cleaner element) every 15,000 miles (24,000 km) or 12 months under condition B or E.
- Replace engine oil and oil filter every 3,750 miles (6,000 km) or 3 months under condition A, B or F.
- Replace transmission oil every 15,000 miles (24,000 km) or 12 months under condition F.
- Inspect the clutch release arm travel every 3,750 miles (6,000 km) or 3 months under condition A, B, C, E or F.
- Inspect front brake discs and calipers, and rear brake discs, calipers and pads every 7,500 miles (12,000 km) or 6 months under condition A, B, D, E or F.
- Inspect the power steering system every 7,500 miles (12,000 km) or 6 months under conditions B, C or E.

## **Engine**

<b>Engine Removal/Installation .....</b>	<b>5-1</b>
<b>Cylinder Head/Valve Train .....</b>	<b>6-1</b>
<b>Engine Block .....</b>	<b>7-1</b>
<b>Engine Lubrication .....</b>	<b>8-1</b>
<b>Intake Manifold/Exhaust System .....</b>	<b>9-1</b>
<b>Cooling .....</b>	<b>10-1</b>





## Engine Removal/Installation



# Engine Removal/Installation

## ⚠ WARNING

- Make sure jacks and safety stands are placed properly and hoist brackets are attached to the correct positions on the engine (see section 1).
- Apply parking brake and block rear wheels so the car will not roll off stands and fall while you are working under it.

## CAUTION:

- Use fender covers to avoid damaging painted surface.
- Unspecified items are common.
- Unplug the wiring connectors carefully while holding the connector portion to avoid damage.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses or interfere with other parts.

## NOTE:

- Anti-theft radios have a coded theft protection circuit.

Be sure to get the customer's code number before.

- Disconnecting the battery.
- Removing the No. 14 (15A) fuse.
- Removing the radio.

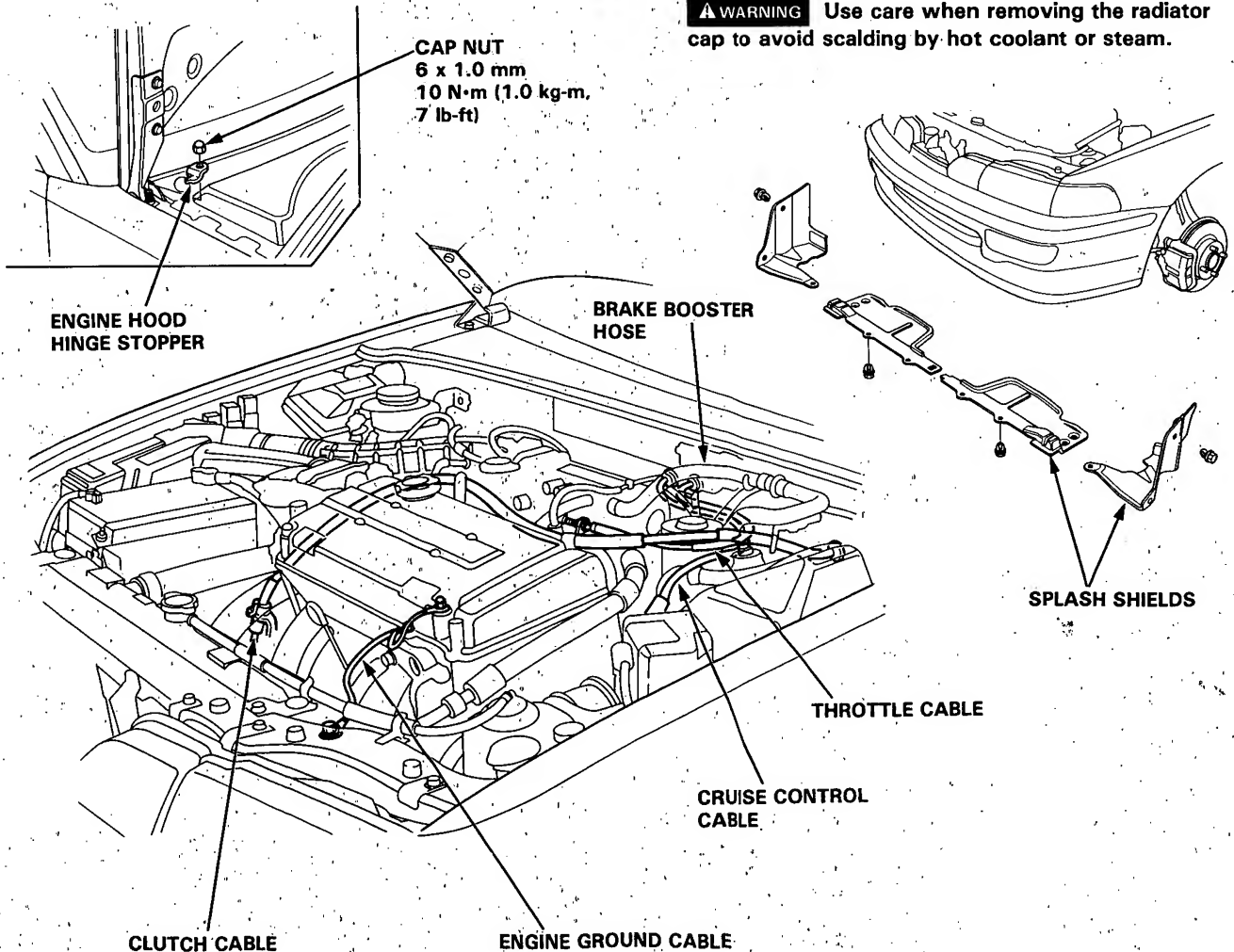
After service, reconnect power to the radio and turn it on.

When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

1. Remove the engine hood hinge stopperes.
2. Secure the hood as far open as possible.
3. Disconnect the battery negative terminal first, then the positive terminal.
4. Remove the radiator cap.

## ⚠ WARNING

Use care when removing the radiator cap to avoid scalding by hot coolant or steam.







5. Raise the hoist to full height.
6. Remove the front wheels and the engine splash shields.
  - Loosen the drain plug from the radiator lower tank. Install the drain plug using a new O-ring.

**▲ WARNING** Make sure the car will not roll off stands and fall while you are working under it.

7. Drain the transmission oil/fluid. Reinstall the drain plug using a new washer.
8. Drain the engine oil. Reinstall the drain plug using a new washer.

**CAUTION:** Do not over tighten the drain plug.

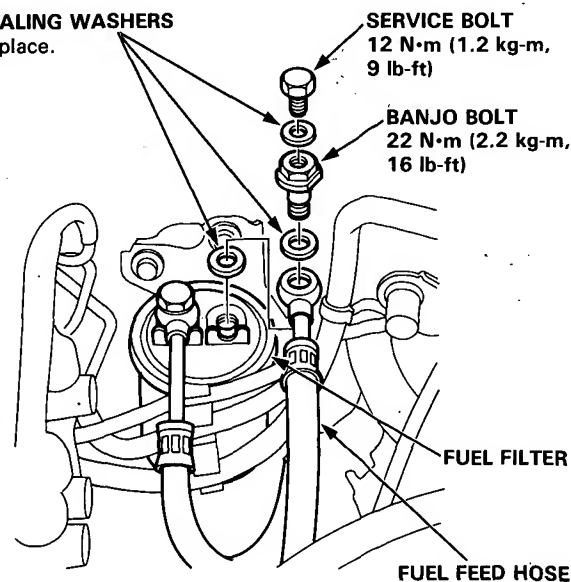
9. Lower the hoist.
10. Relieve fuel pressure by slowly loosening the service bolt on the fuel filter about one turn (see section 11), then remove the fuel feed hose.

**▲ WARNING** Do not smoke while working on the fuel system. Keep away from work area. Drain fuel only into an approved container.

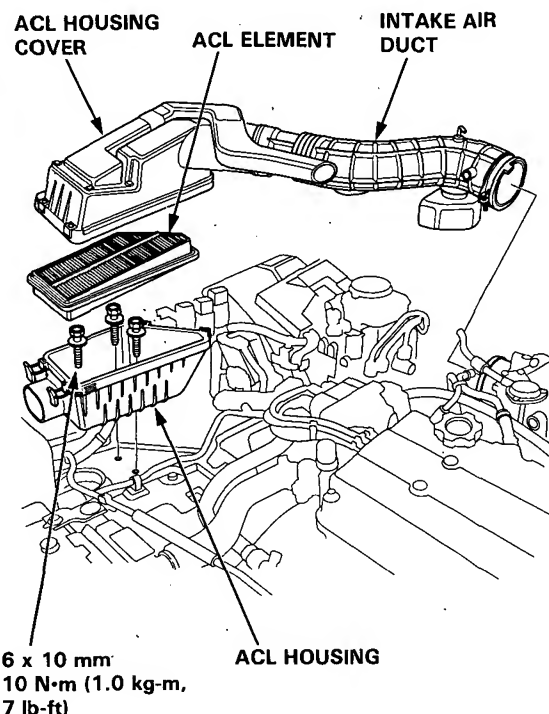
**CAUTION:**

- Before disconnecting any fuel line, the fuel pressure should be relieved as described above.
- Place a shop towel over the fuel filter to prevent pressurized fuel from spraying over the engine.

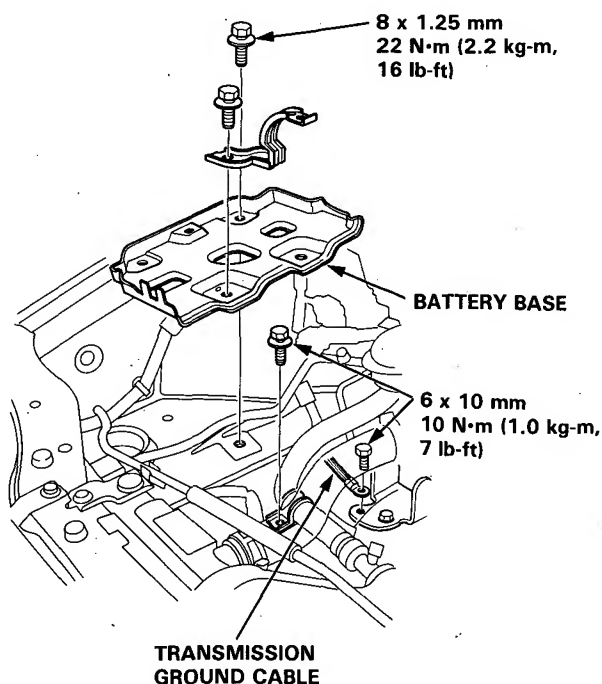
**SEALING WASHERS**  
Replace.



11. Remove the intake air duct and air cleaner (ACL) housing.



12. Remove the battery, battery base and transmission ground cable.

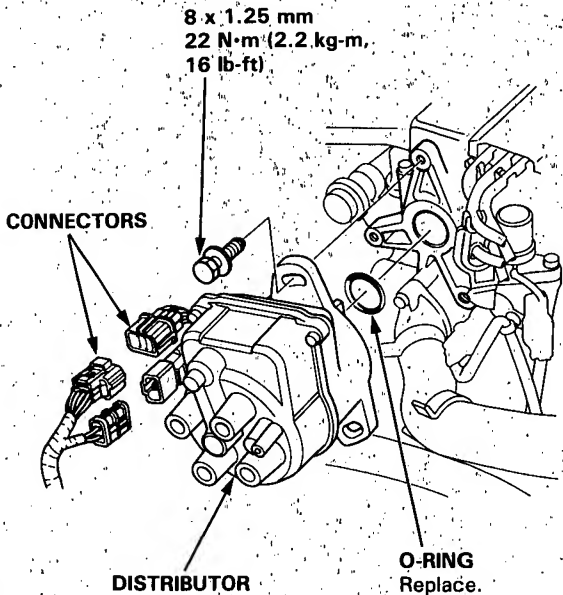


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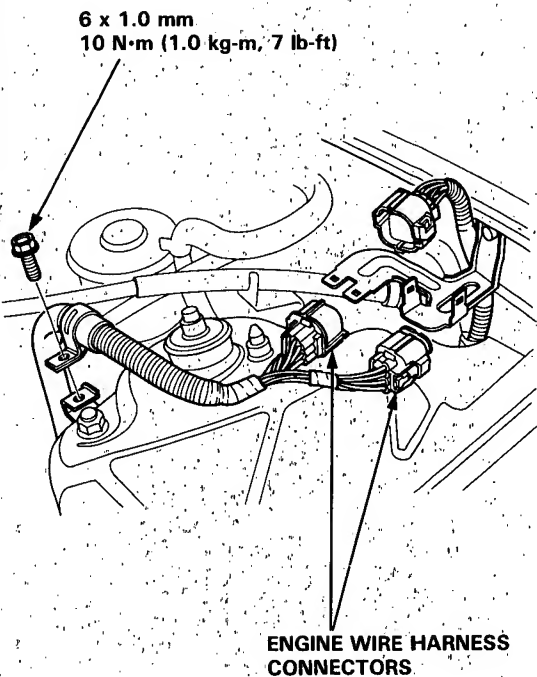
# Engine Removal/Installation

(cont'd)

13. Disconnect the two connectors, then remove the distributor.



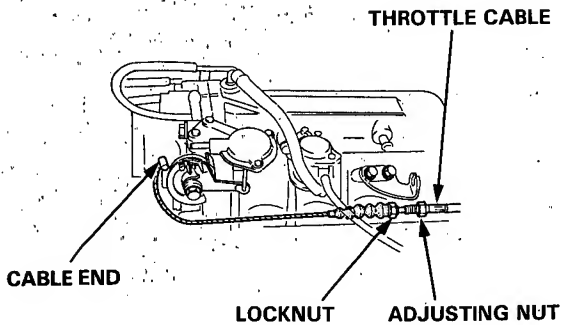
14. Remove the engine wire harness connector on the left side of engine compartment.



15. Remove the throttle cable by loosening the locknut, then slip the cable end out of the accelerator linkage.

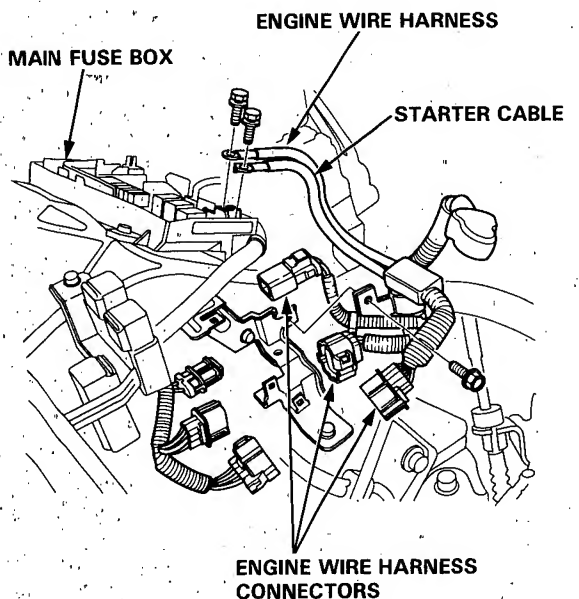
## NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the throttle cable when installing (see section 11).



16. Remove the engine wire harness connectors, terminal and clamps on the right side of engine compartment.

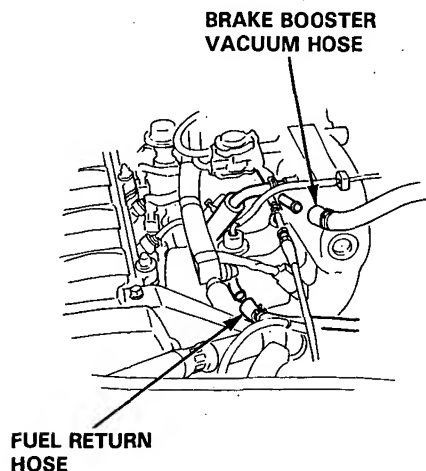
17. Remove the engine wire harness and starter cable from the main fuse box.





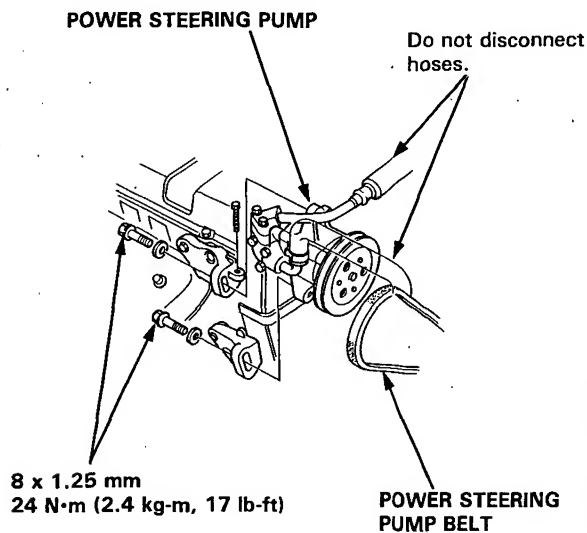
18. Remove the emission control vacuum hoses from the intake manifold.

19. Remove the brake booster vacuum hose and fuel return hose.



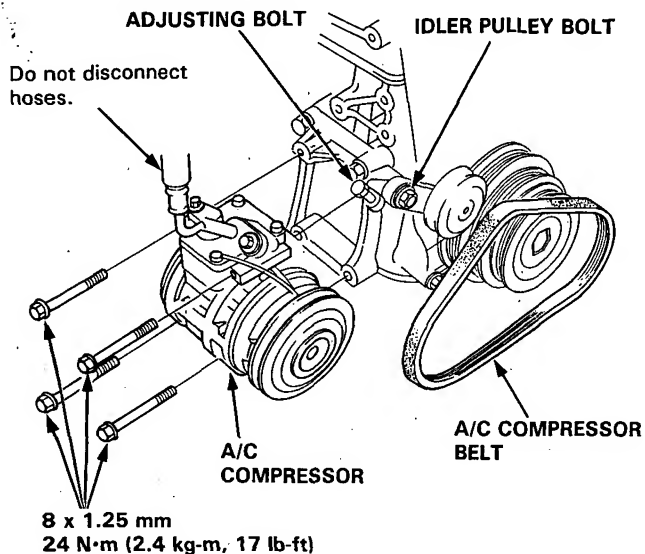
20. Remove the engine ground cable from the cylinder head.

21. Remove the power steering belt and pump.  
● Do not disconnect the power steering hoses.



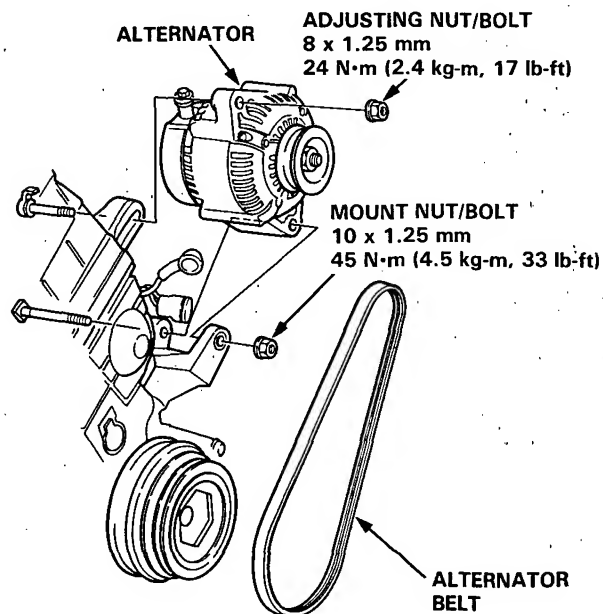
22. Remove the air conditioning (A/C) belt.

23. Remove the air conditioning compressor.  
● Do not disconnect the air conditioning hoses.  
● Disconnect the connector.



24. Remove the alternator.

- Disconnect the alternator wire harness connectors.
- Remove the adjusting nut/bolt and the belt.
- Remove the mount nut/bolt the and alternator.



(cont'd)

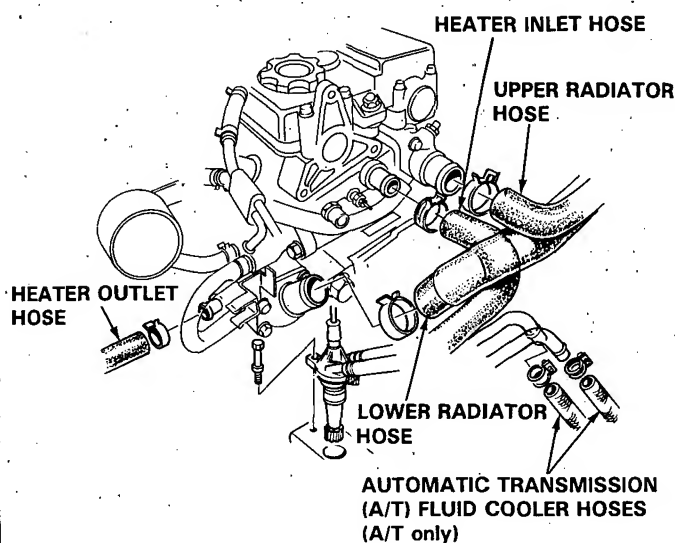
# Engine Removal/Installation

(cont'd)

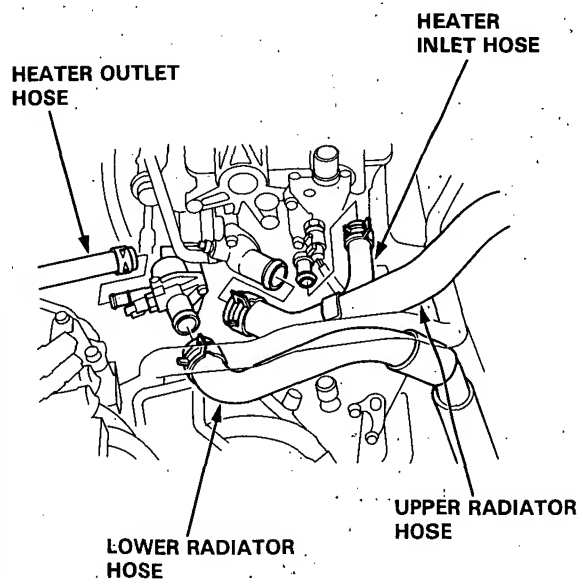
25. Remove the radiator hoses and the heater hoses.

26. Remove the automatic transmission fluid (ATF) cooler hoses.

B18A1 engine:

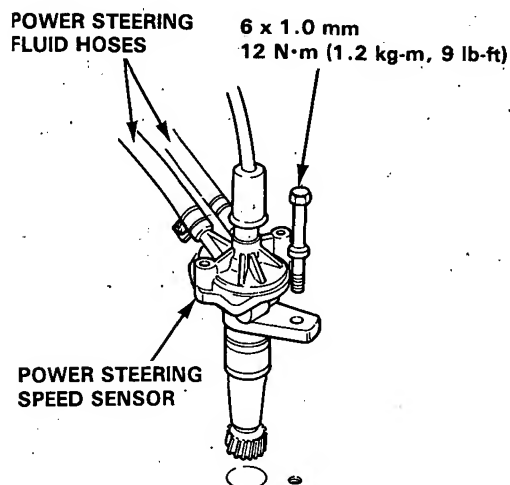


B17A1 engine:



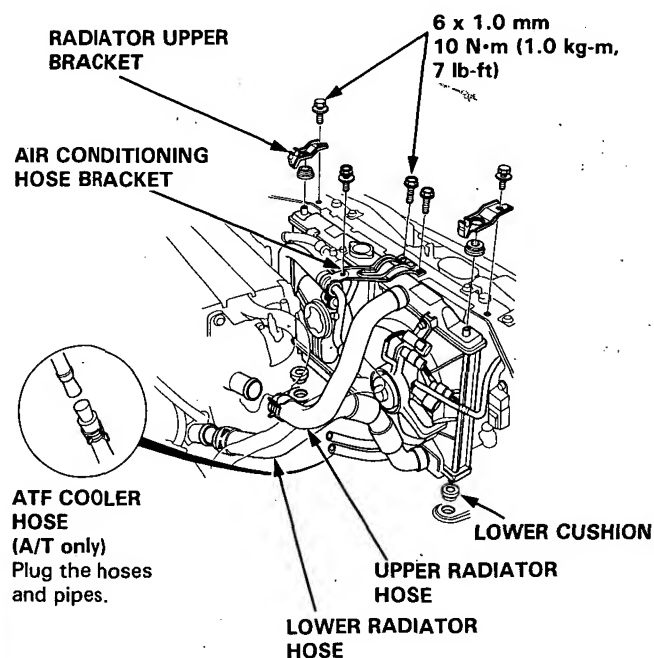
27. Remove the power steering speed sensor.

● Do not disconnect the power steering fluid hoses.



28. Remove the radiator as shown.

● Disconnect the fan motor connector(s).





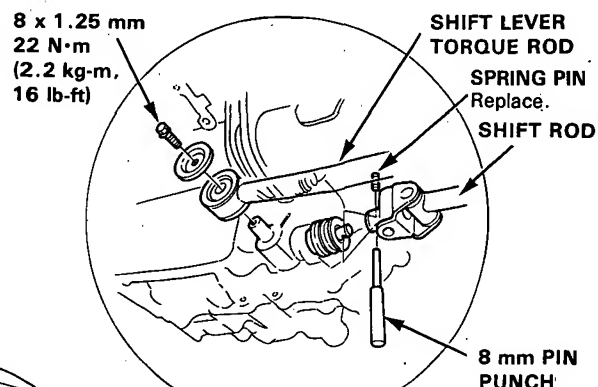
29. Remove exhaust pipe A. Disconnect lower arm ball joints and remove the driveshafts from the transmission (see section 16).

Manual transmission equipped cars:

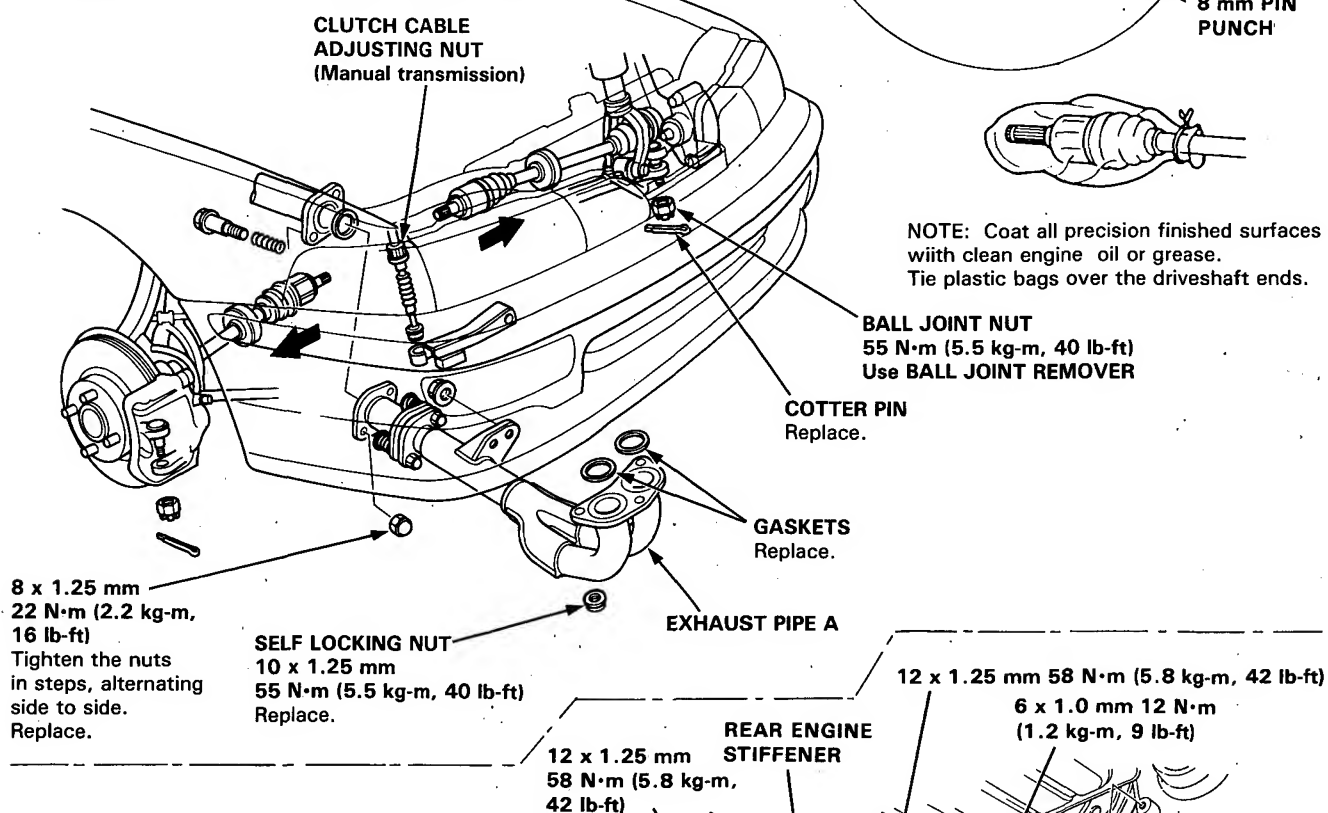
30. Remove the clutch cable.

NOTE: Take care not to bend the cable when removing it. Always replace a kinked cable with a new one.

31. Remove the shift lever torque rod and shift rod.



NOTE: Coat all precision finished surfaces with clean engine oil or grease. Tie plastic bags over the driveshaft ends.

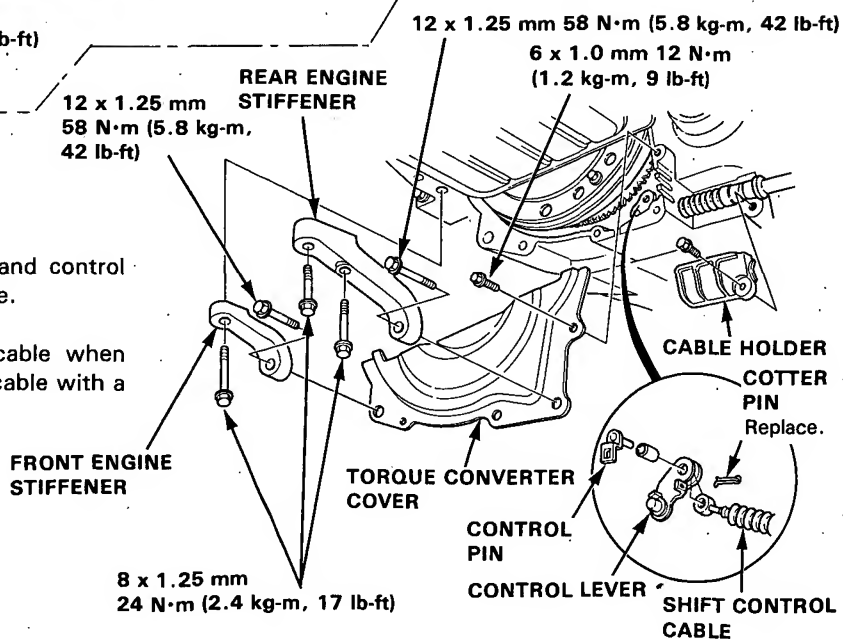


Automatic transmission equipped cars:

32. Remove the torque converter cover.

33. Remove the cable holder, cotter pin and control pin, then remove the shift control cable.

NOTE: Take care not to bend the cable when removing it. Always replace a kinked cable with a new one.



(cont'd)

# Engine Removal/Installation

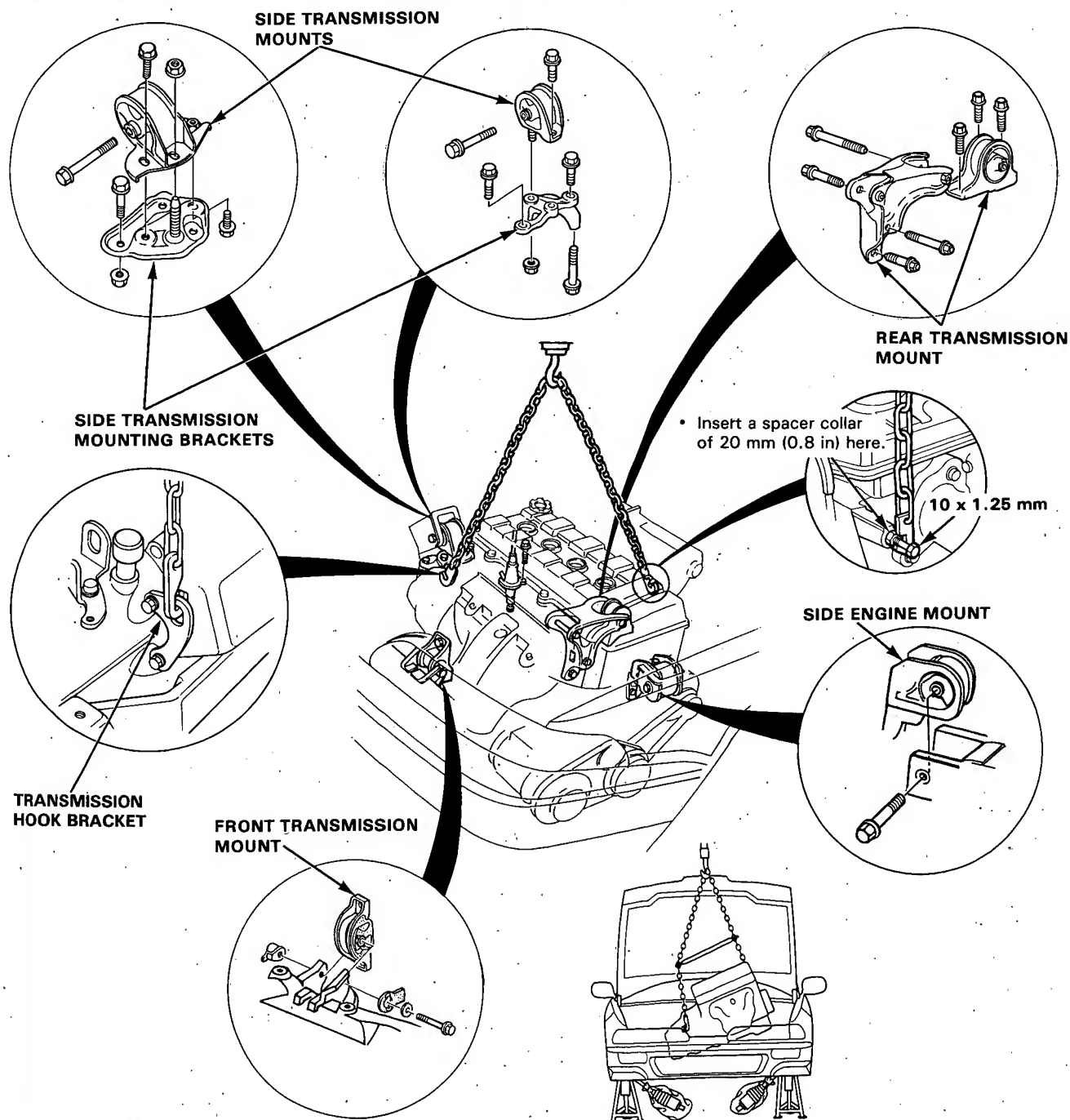
(cont'd)

34. Attach a chain hoist to the engine. Raise the hoist to remove all slack from the chain.
35. Remove the rear transmission mount and rear transmission mounting bracket.
36. Remove the front transmission mount.
37. Remove the side transmission mount and side transmission mounting bracket.
38. Remove the side engine mount.

39. Check that the engine/transaxle is completely free of vacuum, fuel and engine coolant hoses, and electrical wiring.
40. Slowly raise the engine approximately 150 mm (6 in). Check once again that all wires and hoses have been disconnected from the engine/transaxle.
41. Raise the engine/transaxle all the way and remove it from the car.

MANUAL TRANSMISSION (M/T):

AUTOMATIC TRANSMISSION (A/T):





42. Install the engine in the reverse order of removal.  
After the engine is in place:

- Torque engine mounting bolts in sequence shown.

**CAUTION:** Failure to tighten the bolts in the proper sequence can cause excessive noise and vibration, and reduce bushing life: check that the bushings are not twisted or offset.

- Check that the spring clip on the end of each driveshaft clicks into place.

**CAUTION:** Use new spring clips.

- Bleed air from the cooling system at the bleed bolt with the heater valve open.
- Adjust the throttle cable tension.

### ENGINE MOUNTING TORQUE SEQUENCE

#### MANUAL TRANSMISSION (M/T):

- ⑧ Tighten snug only  
12 x 1.25 mm
- ⑨ 55 N·m (5.5 kg-m, 40 lb-ft)
- ⑥ 12 x 1.25 mm  
75 N·m (7.5 kg-m, 54 lb-ft)

- ⑦ 12 x 1.25 mm  
55 N·m (5.5 kg-m, 40 lb-ft)

- ④ 12 x 1.25 mm  
65 N·m (6.5 kg-m, 47 lb-ft)

- ⑤ Tighten snug only  
SPECIAL BOLT
- ⑩ 12 x 1.25 mm  
60 N·m (6.0 kg-m, 43 lb-ft)  
Replace.

- ⑪ 12 x 1.25 mm  
75 N·m (7.5 kg-m, 54 lb-ft)

#### AUTOMATIC TRANSMISSION (A/T):

- 12 x 1.25 mm  
60 N·m (6.0 kg-m, 43 lb-ft)

- 12 x 1.25 mm  
55 N·m (5.5 kg-m, 40 lb-ft)

- 12 x 1.25 mm  
60 N·m (6.0 kg-m, 43 lb-ft)

- ③ Tighten snug only  
SPECIAL BOLT
- 12 x 1.25 mm
- ⑬ 60 N·m (6.0 kg-m, 43 lb-ft)  
Replace.

- ⑩ 10 x 1.25 mm  
60 N·m (6.0 kg-m, 43 lb-ft)

- SPECIAL BOLT
- ⑫ 12 x 1.25 mm  
60 N·m (6.0 kg-m, 43 lb-ft)  
Replace.

- ⑨ Tighten snug only  
12 x 1.25 mm

- ⑭ 55 N·m (5.5 kg-m, 40 lb-ft)

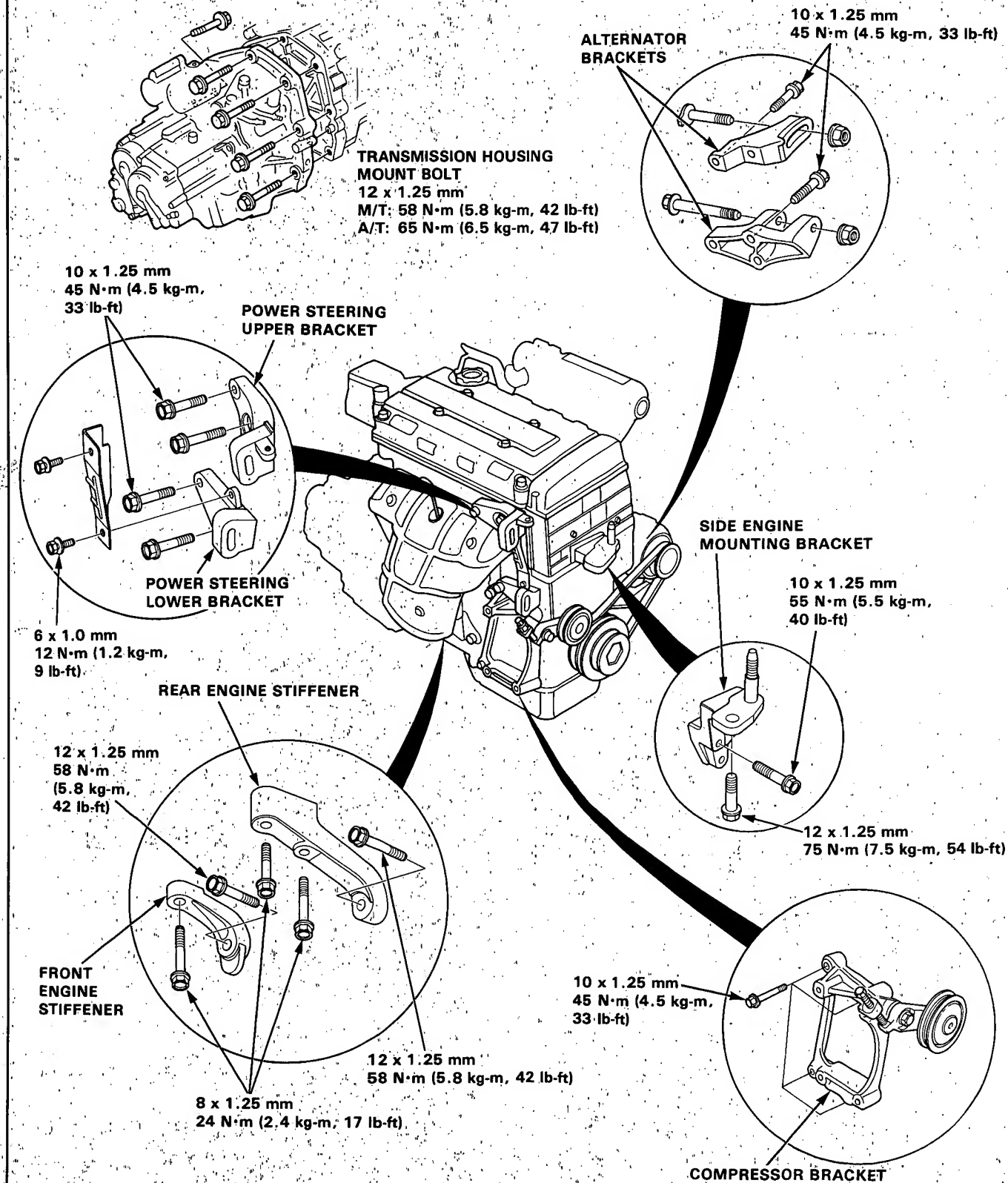
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# Engine Removal/Installation

(cont'd)

## Additional Torque Value Specifications:

NOTE: For manifold replacement, refer to section 9.





## Cylinder Head/Valve Train

B18A1 engine .....	6-1
B17A1 engine .....	6-27





# Cylinder Head/Valve Train

## B18A1 engine

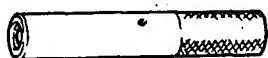
Special Tools .....	6-2
Valve Clearance Adjustment .....	6-3
Valve Seal Replacement (cylinder head removal not required) .....	6-5
Illustrated Index .....	6-7
Cylinder Head	
Removal .....	6-9
Warpage .....	6-19
Installation .....	6-19
Camshaft Pulleys Removal .....	6-11
Camshafts Inspection .....	6-12
Valves, Valve Springs and Valve Seals	
Removal .....	6-13
Valve Spring and Valve Seal Installa- tion Sequence .....	6-14
Valve Installation .....	6-15

Valve Guides	
Valve Movement .....	6-15
Replacement .....	6-16
Reaming .....	6-17
Valve Seats Reconditioning .....	6-18
Timing Belt	
Illustrated Index .....	6-22
Inspection .....	6-23
Tension Adjustment .....	6-23
Replacement .....	6-24
Positioning Crankshaft Before Installing Timing Belt .....	6-26

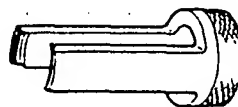


# Special Tools

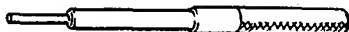
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAD—PH70100	Valve Guide Seal Installer	1	6-14
②	07757—PJ1010A	Valve Spring Compressor Attachment	1	6-13
③	07942—6570100	Valve Guide Driver, 6.6 mm	1	6-16, 17
④	07984—657010C	Valve Guide Reamer, 6.6 mm	1	6-17



①



②



③



④

# Valve Clearance

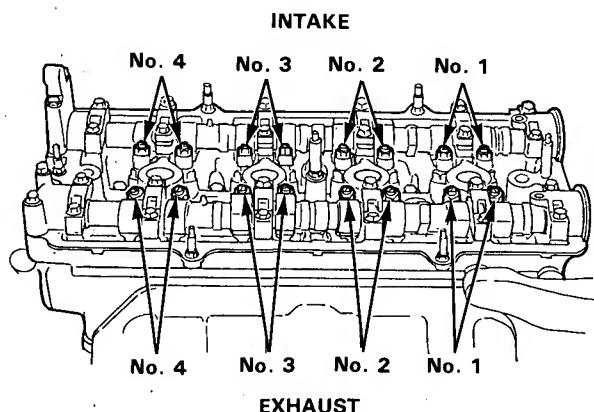


## Adjustment

### NOTE:

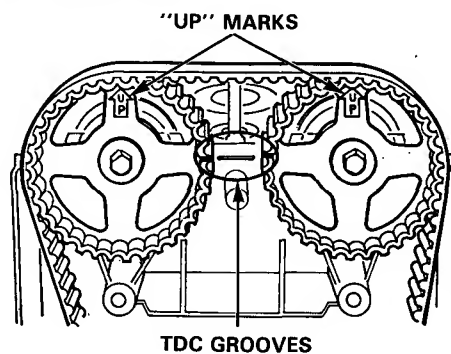
- Valves should be adjusted cold; the cylinder head temperature is less than 100°F (38°C). Adjustment is the same for both intake and exhaust valves.
- After adjusting, retorque the crankshaft pulley bolt to 180 N·m (18.0 kg·m, 130 lb-ft).

1. Remove cylinder head cover.



2. Set the No. 1 piston at top dead center (TDC) (page 6-26). "UP" mark on the pulley should be at the top, and the TDC grooves on the pulley should align with the TDC groove on timing belt back cover. TDC mark (painted white) on the crankshaft pulley should align with pointer on the timing belt lower cover.

### Number 1 Piston at TDC



POINTER ON  
LOWER COVER

TDC MARKS  
(Painted White)

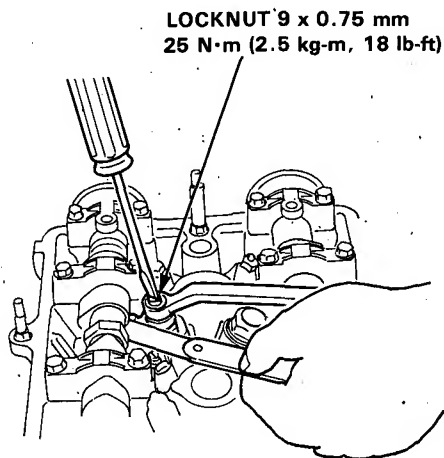
CRANKSHAFT  
PULLEY

Direction of  
rotation.

# Valve Clearance

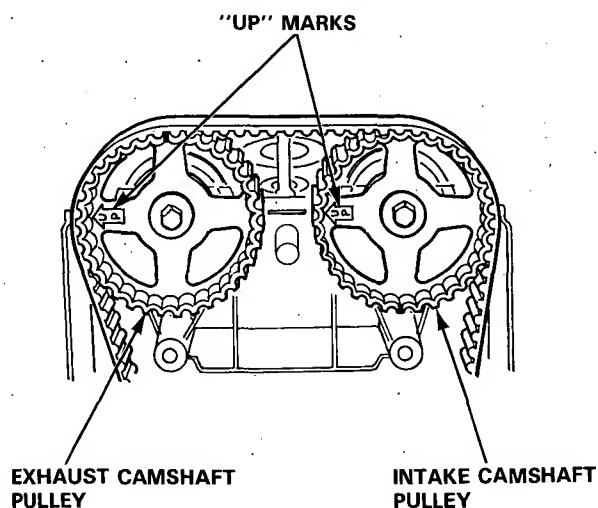
## Adjustment (cont'd)

3. Adjust valve clearances on No. 1 cylinder.  
Intake: 0.08–0.12 mm (0.003–0.005 in)  
Exhaust: 0.16–0.20 mm (0.006–0.008 in)
4. Loosen the locknut and turn the adjustment screw until feeler gauge slides back and forth with a slight amount of drag.



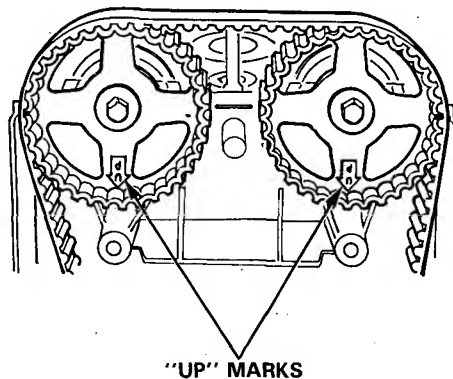
5. Tighten the locknut and recheck clearance again. Repeat adjustment if necessary.
6. Rotate the crankshaft 180° counterclockwise (camshaft pulley turns 90°). The "UP" mark should be on the exhaust side. Adjust valves on No. 3 cylinder.

Number 3 piston at TDC



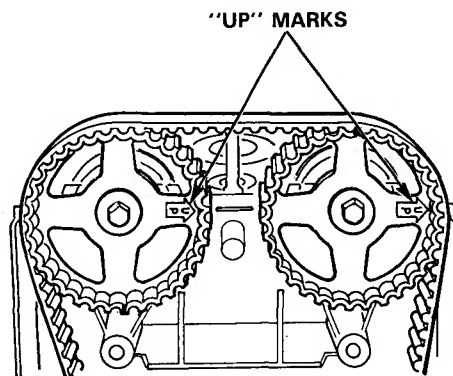
7. Rotate the crankshaft 180° counterclockwise to bring No. 4 piston to TDC. Both TDC grooves are once again visible. Adjust valves on No. 4 cylinder.

Number 4 piston at TDC



8. Rotate the crankshaft 180° counterclockwise to bring No. 2 piston to TDC. The "UP" mark should be on the intake side. Adjust valves on No. 2 cylinder.

Number 2 piston at TDC.



# Valve Seals



## Replacement (cylinder head removal not required)

NOTE: Cylinder head removal is not required in this procedure.

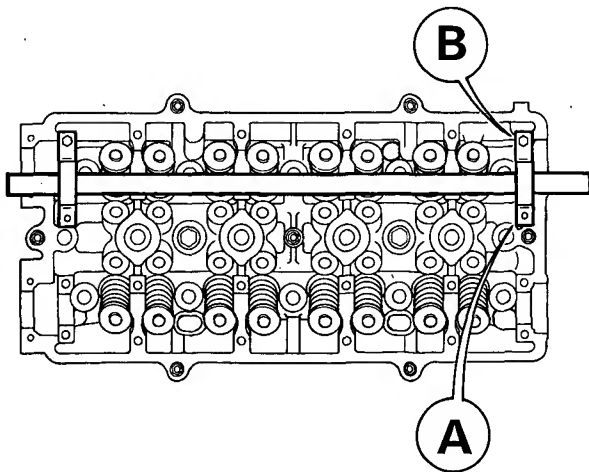
The procedure shown below applies when using the in-car valve spring compressor. (Snap-on YA8845 with YA8845-2A 7/8" attachment)

**⚠ WARNING** When using this tool, as with any tool, always use approved eye protection. Using the right tool for each job helps increase productivity while safeguarding tools, equipment and the user.

1. Turn the crankshaft so that the No. 1 and the No. 4 pistons are at top dead center (TDC).
2. Remove the cylinder head cover.
3. Remove the distributor.
4. Loosen and disconnect the timing belt from the camshaft pulleys.
5. Remove the camshaft holder bolts, then remove the camshaft holder, the camshaft and rocker arms.

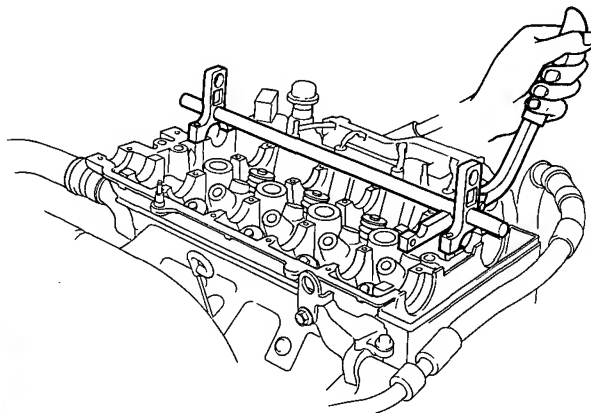
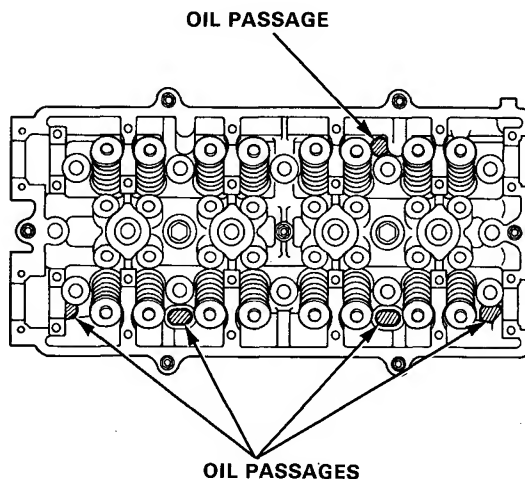
### Intake Valve Seals

6. Using the 6 mm bolts supplied with the tool, mount the two uprights to the cylinder head at the end camshaft holders. The uprights fit as shown.
7. Insert the cross shaft through the bottom hole of the two uprights.



8. Select the 7/8 in. diameter long compressor attachment and fasten the attachment to the No. 4 hole of the lever arm with the speed pin supplied.
9. Position the piston at TDC and insert an air adaptor into the spark plug hole. Pump air into the cylinder to keep the valve closed while compressing springs and removing the valve keepers.
10. Position the lever arm under the cross shaft so the lever is perpendicular to the shaft and the compressor attachment rests on top of the retainer for the spring being compressed. Use the rear position slot on the lever as shown.

NOTE: Put shop towels over the oil passages to prevent the valve keepers from falling into the cylinder head.



(cont'd)

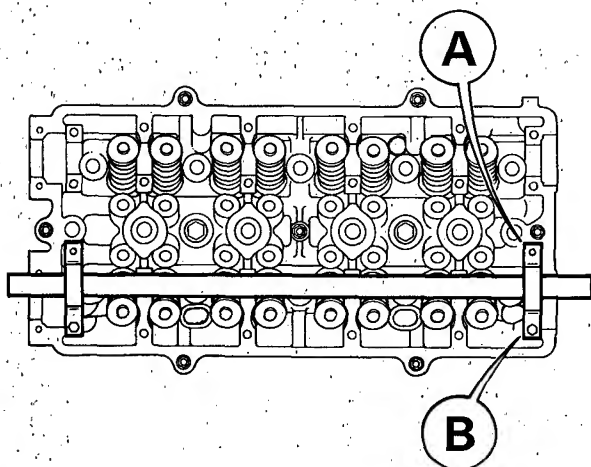
# Valve Seals

## Replacement (cylinder head removal not required) (cont'd)

11. Using a downward motion on the lever arm, compress the valve spring and remove the keepers from the valve stem. Slowly release pressure on the spring.
12. Repeat step 11 for the other valve in that cylinder.
13. Remove the valve seals (page 6-13).
14. Install the valve seals (page 6-14).
15. Install the springs, the retainers and the keepers in reverse order of removal.
16. Repeat steps 9 to 15 for the other three cylinders.

### Exhaust Valve Seals

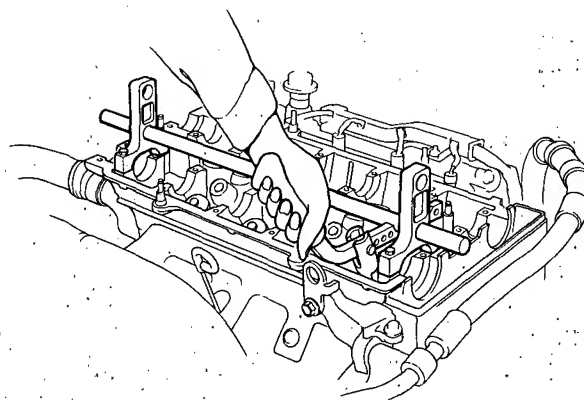
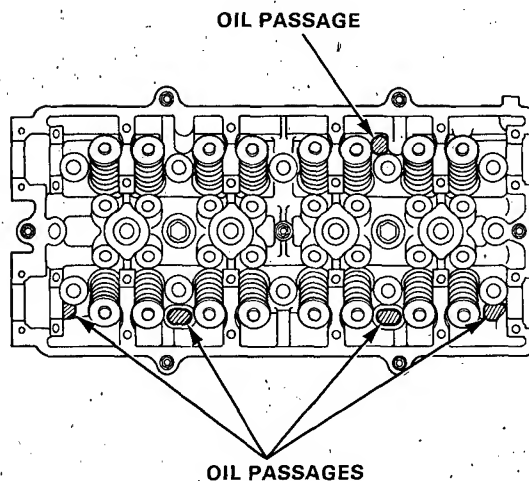
17. Using the 6 mm bolts supplied with the tool, mount the two uprights to the cylinder head at the end camshaft holders. The uprights fit as shown.
18. Insert the cross shaft through the bottom hole of the two uprights.



19. Select the 7/8 in. diameter short compressor attachment and fasten the attachment to the No. 4 hole of the lever arm with the speed pin supplied.
20. Position the piston at TDC and insert an air adaptor into the spark plug hole. Pump air into the cylinder to keep the valve closed while compressing springs and removing the valve keepers.

21. Position the lever arm under the cross shaft so the lever is perpendicular to the shaft and the compressor attachment rests on top of the retainer for the spring being compressed. Use the rear position slot on the lever as shown.

**NOTE:** Put shop towels over the oil passages to prevent the valve keepers from falling into the cylinder head.



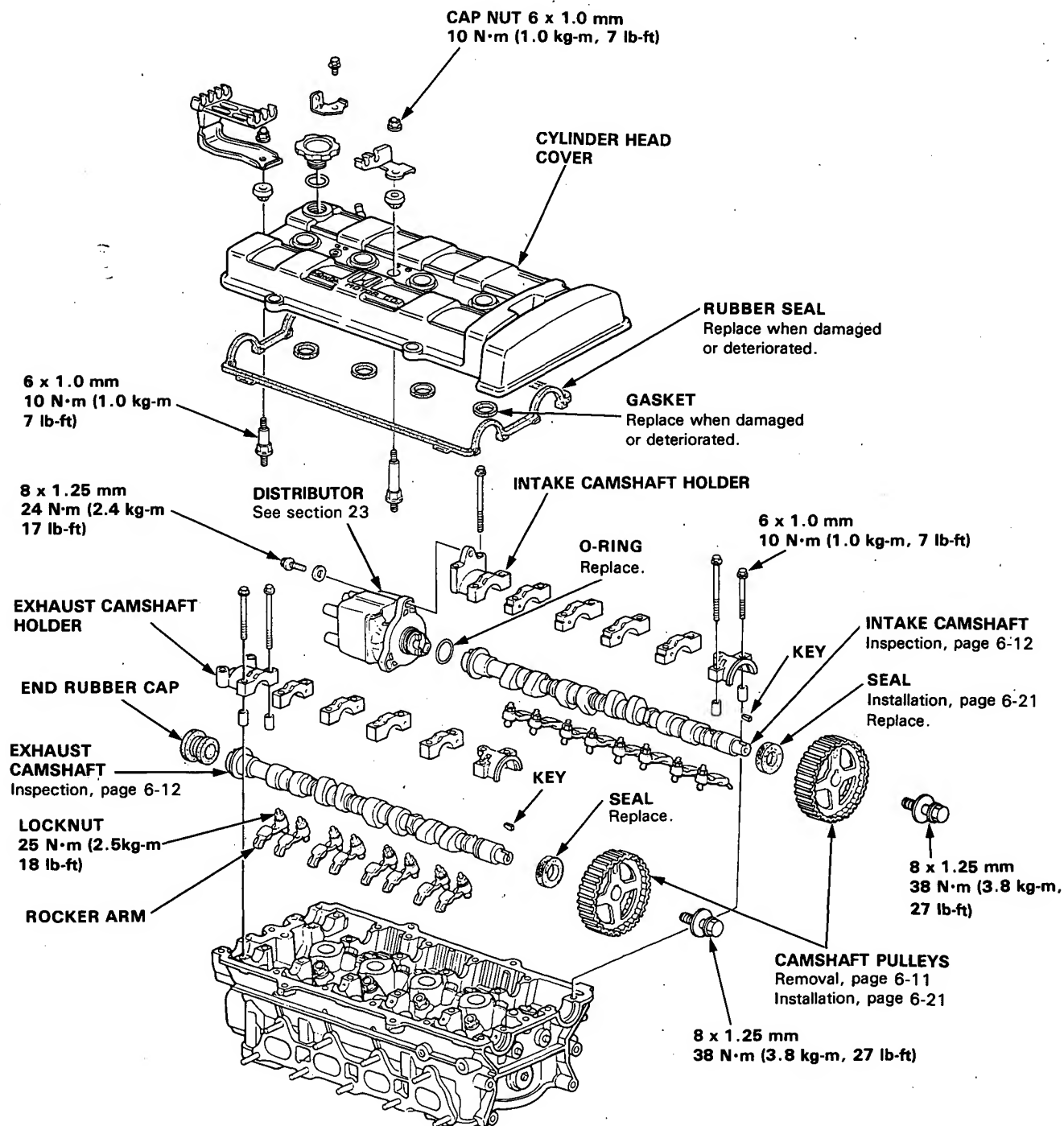
22. Using a downward motion on the lever arm, compress the valve spring and remove the keepers from the valve stem. Slowly release pressure on the spring.
23. Repeat step 22 for the other valve in that cylinder.
24. Remove the valve seals (page 6-13).
25. Install the valve seals (page 6-14).
26. Install the springs, the retainers and the keepers in reverse order of removal.
27. Repeat steps 20 to 26 on the other three cylinders.



# Illustrated Index



NOTE: Use new O-rings and gaskets when reassembling.

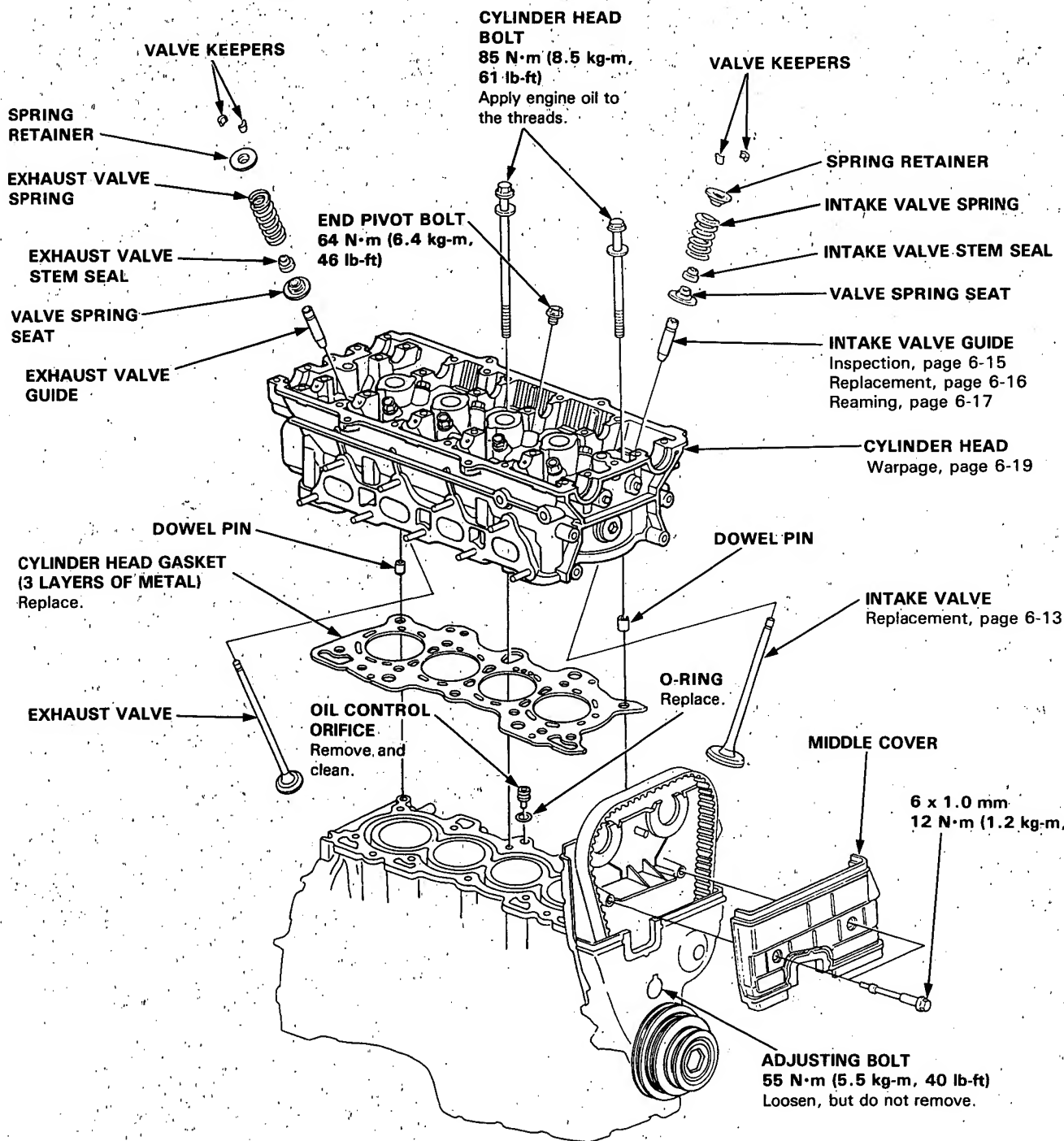


(cont'd)

# Illustrated Index (cont'd)

## CAUTION:

- To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 100°F (38°C) before removing it.
- In handling a metal gasket, take care not to fold it or damage the contact surface of the gasket.



# Cylinder Head



## Removal

Engine removal is not required in this procedure.

### CAUTION:

- Do not remove the cylinder head until the engine coolant temperature drops below 100°F (38°C).

### NOTE:

- Inspect the timing belt before removing the cylinder head (page 6-23).
- Before removal of the cylinder head, turn the crankshaft so the No. 1 cylinder is at top dead center (TDC) (page 6-26).
- Mark all emission hoses before disconnecting them.

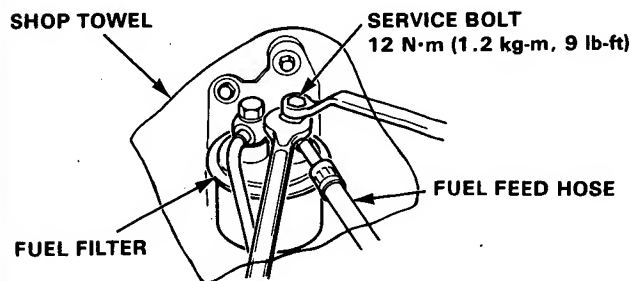
1. Disconnect the battery negative terminal first, then the positive terminal.

### NOTE:

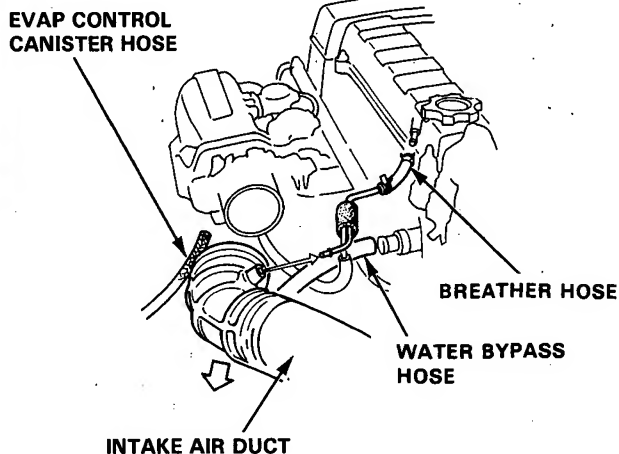
- Anti-theft radios have a coded theft protection circuit. Be sure to get the customer's code number before.
  - Disconnecting the battery.
  - Removing the No. 14 (15A) fuse.
  - Removing the radio.
 After service, reconnect power to the radio and turn it on.  
 When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

2. Drain the engine coolant (see section 10).
3. Relieve fuel pressure (see section 11).

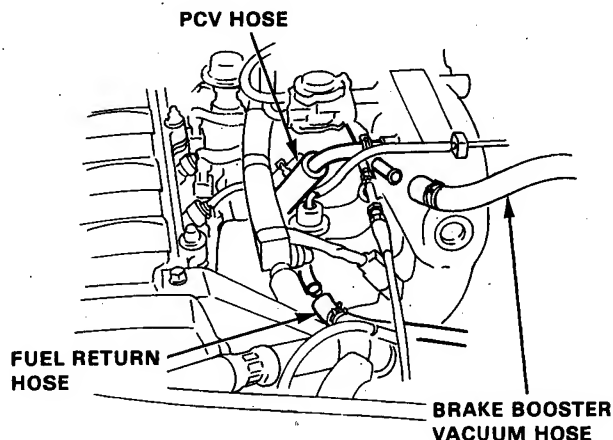
**⚠ WARNING** Do not smoke while working on the fuel system, keep open flame or spark away from work area. Drain fuel only into an approved container.



4. Disconnect the fuel feed hose.
5. Remove the vacuum hose, breather hose and intake air duct.
6. Remove the water bypass hose from the cylinder head.
7. Remove the evaporative emission (EVAP) control canister hose from the throttle body.



8. Remove the brake booster vacuum hose from the intake manifold.
9. Remove the fuel return hose.
10. Remove the positive crankcase ventilation (PCV) hose.



11. Remove the throttle cable from the throttle body.  
 NOTE: Take care not to bend the cable when removing it. Always replace a kinked cable with a new one.
12. Disconnect the two connectors from the distributor.
  - Ignition coil connector
  - TDC/CKP/CYP sensor connector
13. Remove the spark plug caps and distributor (page 5-4).
14. Disconnect the emission vacuum hoses from intake manifold.  
 NOTE:
  - Mark all emission vacuum hoses before disconnecting them.
15. Disconnect the three engine harness connectors on the left side of the engine compartment.

(cont'd)

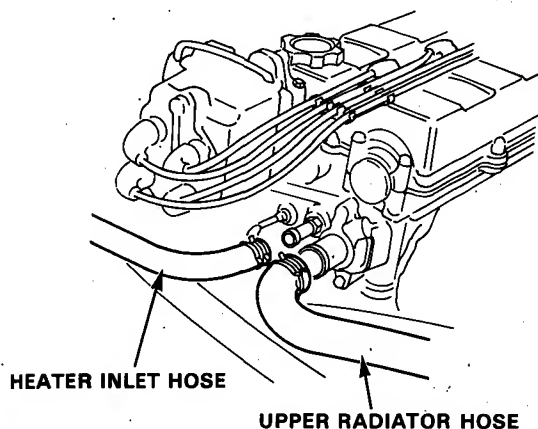
# Cylinder Head

## Removal (cont'd)

16. Disconnect the engine wire harness connector clamps from cylinder head and intake manifold.

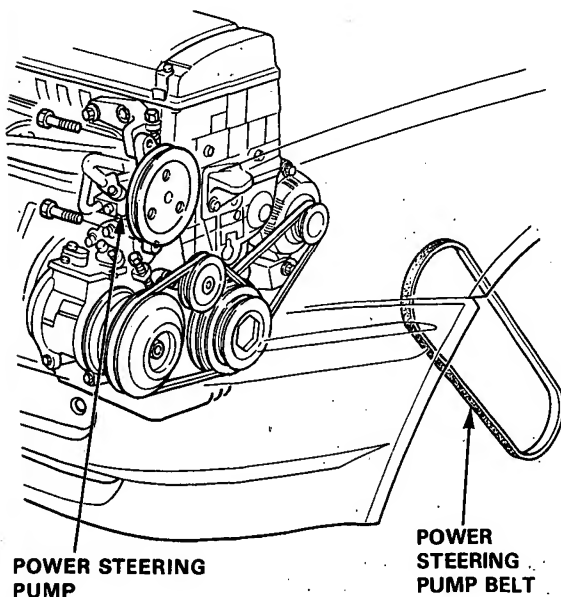
- Four fuel injector connectors
- Intake air temperature (IAT) sensor connector
- Throttle position (TP) sensor connector
- Exhaust gas recirculation (EGR) valve lift sensor connector (A/T only)
- Ground cable terminal
- Engine coolant temperature (ECT) sensor connector
- ECT switch connector
- ECT gauge sending unit terminal
- Idle air control (IAC) valve connector

17. Remove the upper radiator hose, heater inlet hose from the cylinder head and water bypass hoses from intake manifold.



18. Remove the power steering pump belt and power steering pump.

- Do not disconnect the hoses from the pump.

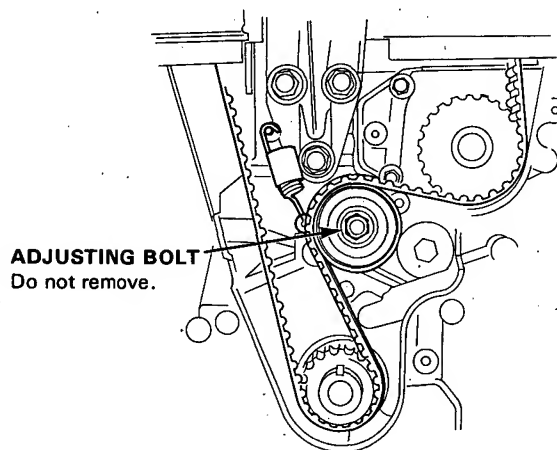


19. Lift the car up and support it on safety stands.

### WARNING

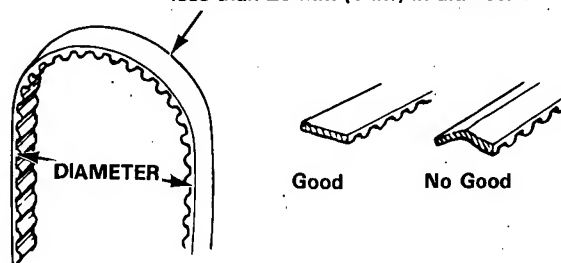
- Make sure jacks and safety stands are placed properly and hoist brackets are attached to correct positions on the engine (see section 1).
- Apply parking brake and block rear wheels, so the car will not roll off stands and fall while you are working under it.

20. Remove the left front wheel.  
21. Remove the left splash shield.  
22. Remove the intake manifold bracket bolts.  
23. Remove the exhaust manifold upper cover.  
24. Remove the exhaust manifold bracket.  
25. Remove the exhaust pipe A.  
26. Remove the exhaust manifold.  
27. Remove the cylinder head cover and engine ground cable.  
28. Remove the timing belt middle cover.  
29. Loosen the timing belt adjusting bolt. Push the tensioner to release tension from the belt then retighten the adjusting bolt.



30. Remove the timing belt from the camshaft pulleys.

**CAUTION:** Do not crimp or bend the timing belt more than 90° or less than 25 mm (1 in.) in diameter.

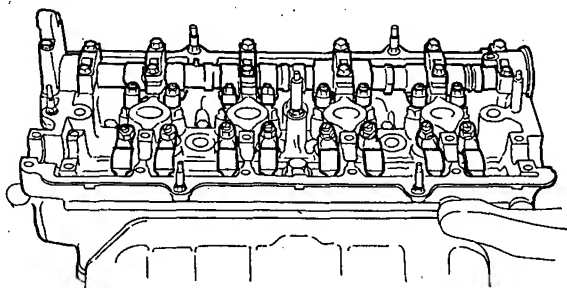




# Camshaft Pulleys

## Removal

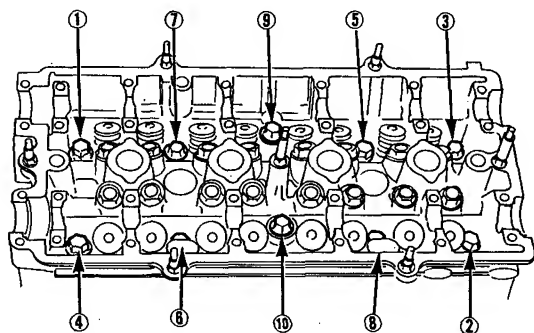
31. Remove the camshaft pulleys.
32. Remove the camshaft holder bolts, then remove the camshaft holders, the camshafts and rocker arms.



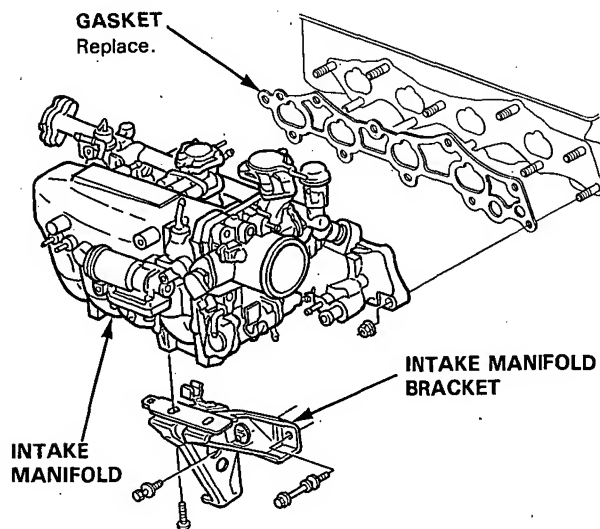
33. Remove the cylinder head bolts, then remove the cylinder head.

**CAUTION:** To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

### CYLINDER HEAD BOLTS LOOSENING SEQUENCE

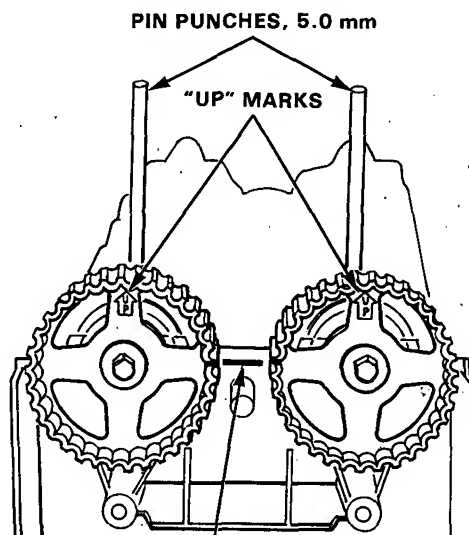


34. Remove the intake manifold.



1. To ease reassembly, turn each pulley until the "UP" marks face up, and the front timing marks are aligned with both marks on the pulleys.

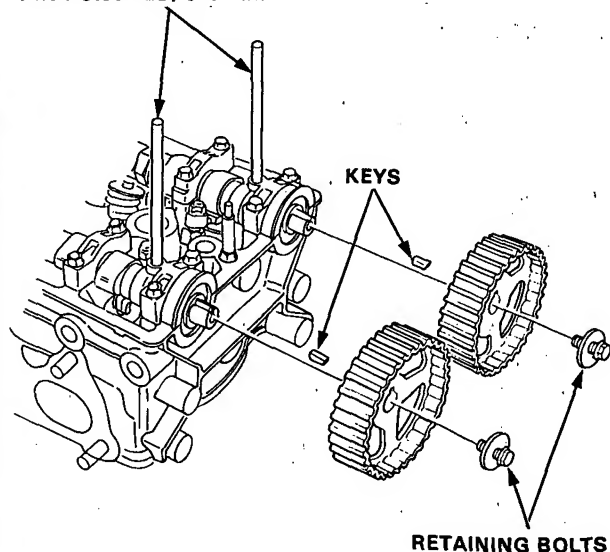
**NOTE:** To set the camshafts at TDC for No. 1 cylinder, align the holes in the camshafts with the holes in the No. 1 camshaft holders and drive 5.0 mm pin punches in the holes.



Align the marks on the pulleys.

2. Remove the pulley retaining bolts, then remove the pulleys.

PIN PUNCHES, 5.0 mm



**NOTE:** Before removing the camshaft, check the camshaft end play.

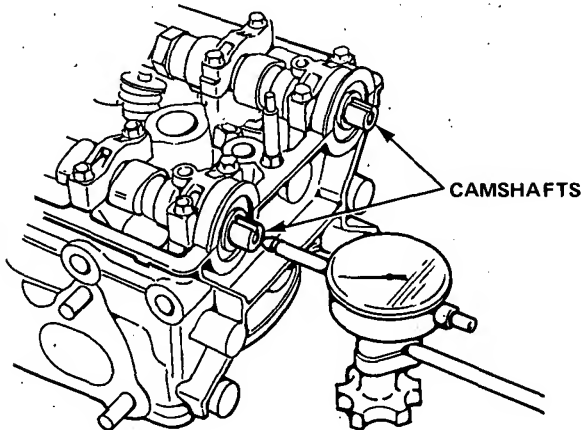
# Camshafts

## Inspection

1. Loosen the adjusting screws.
2. Remove the camshaft holders and the rocker arms.  
  
**NOTE:** Mark the rocker arms before removing them.
3. Tighten the camshaft holder bolts in a crisscross pattern, beginning with the inner bolts.  
10N·m (1.0 kg-m, 7 lb-ft)
4. Seat the camshafts by pushing them toward the distributor end of the head with a screwdriver.
5. Zero the dial indicator against the end of the camshaft, push the camshaft back and forth and read the end play.

### Camshaft End Play:

**Standard (New):** 0.05–0.15 mm  
(0.002–0.006 in)  
**Service Limit:** 0.5 mm (0.02 in)



6. Remove the camshaft holder bolts from the cylinder head.

### NOTE:

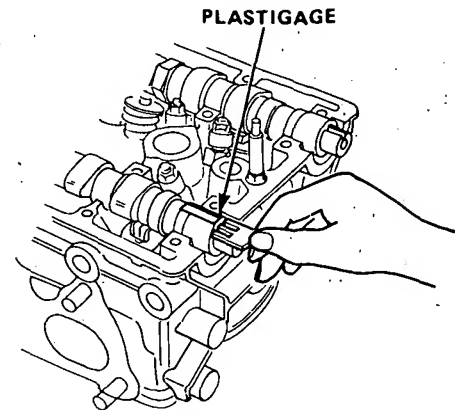
- Unscrew the camshaft holder bolts two turns at a time, in a crisscross pattern.
- Do not rotate the camshafts during inspection.
- Lift the camshafts out of the cylinder head, wipe clean, then inspect lift ramps. Replace the camshafts if any lobes are pitted, scored, or excessively worn.
- Clean the camshaft journal surfaces in the cylinder head, then set camshaft back in place.
- Insert plastigage strip across each journal.
- Install the camshaft holders and torque bolts to the values and in the sequence shown on page 6-20.

7. Measure the widest portion of plastigage on each journal.

### Camshaft-to-Holder Oil Clearance:

**Standard (New):** 0.050–0.089 mm  
(0.002–0.004 in)

**Service Limit:** 0.15 mm (0.006 in)

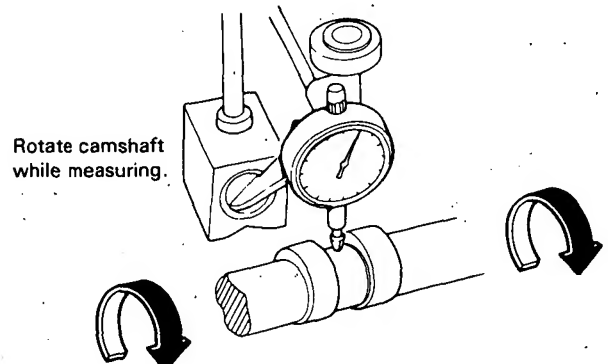


8. If camshaft-to-holder oil clearance is out of tolerance:

- And the camshaft has already been replaced, you must replace the cylinder head.
- If the camshaft has not been replaced, first check total runout with the camshaft supported on V-blocks.

### Camshaft Total Runout:

**Standard (New):** 0.03 mm (0.001 in)  
**Service Limit:** 0.06 mm (0.002 in)



—If the total runout of the camshafts is within tolerance, replace the cylinder head.

—If the total runout is out of tolerance, replace the camshafts and recheck. If the oil clearance is still out of tolerance, replace the cylinder head.

# Valves, Valve Springs and Valve Seals

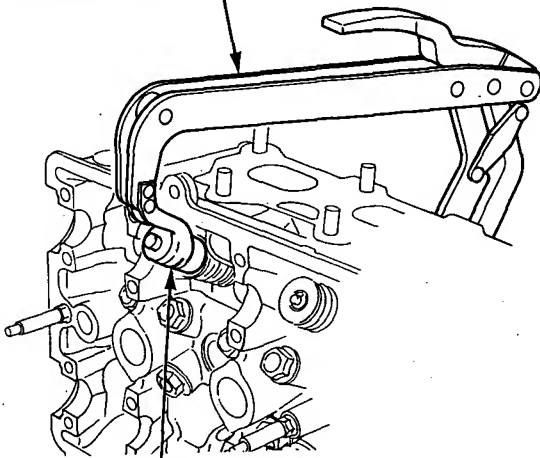


## Removal

**NOTE:** Identify valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Tap each valve stem with a plastic mallet to loosen valve keepers before installing the spring compressor.
2. Install the spring compressor. Compress spring and remove valve keeper.

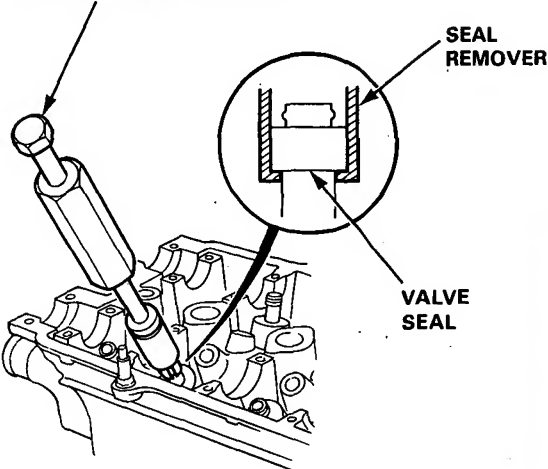
**VALVE SPRING COMPRESSOR**  
KD No. 383, with #35 JAW or  
Snap-on CF711



**ATTACHMENT**  
07757-PJ1010A

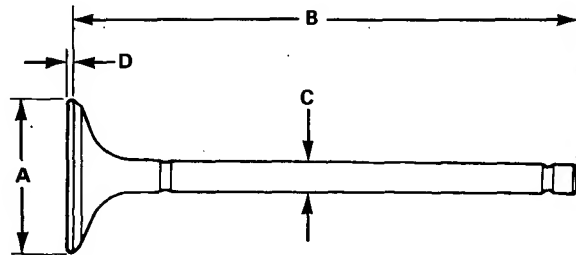
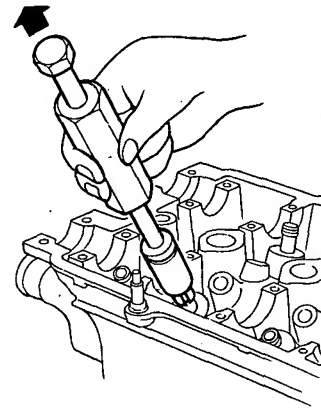
3. Install the special tool as shown.
4. Remove the valve seal.

**COMMERCIALLY AVAILABLE**  
**VALVE GUIDE SEAL REMOVER**  
LISLE P/N 57900 or KD3350



**SEAL**  
**REMOVER**

**VALVE**  
**SEAL**



### Intake Valve Dimensions

A Standard(New):	30.90–31.10 mm (1.217–1.224 in)
B Standard(New):	103.80–104.10 mm (4.087–4.098 in)
C Standard(New):	6.580–6.590 mm (0.2591–0.2594 in)
C Service Limit:	6.55 mm (0.258 in)
D Standard(New):	1.35–1.65 mm (0.053–0.065 in)
D Service Limit:	1.15 mm (0.045 in)

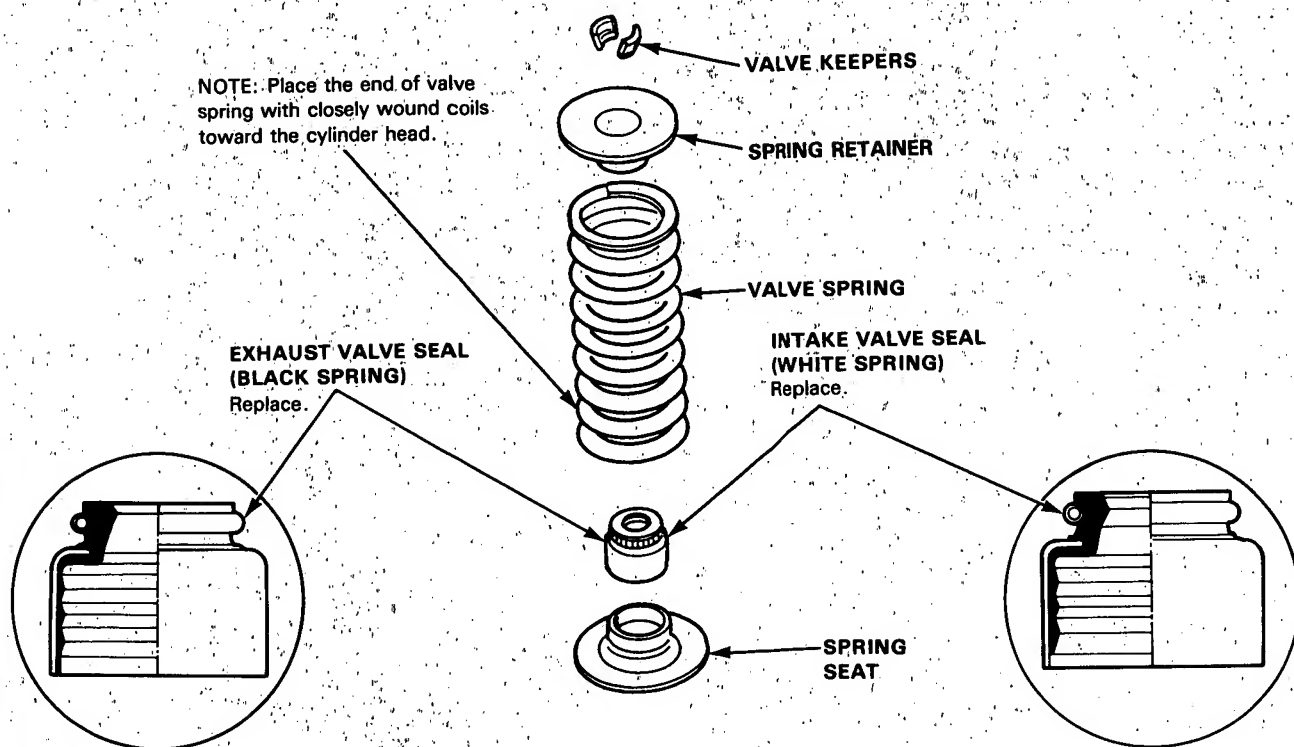
### Exhaust Valve Dimensions

A Standard(New):	27.90–28.10 mm (1.098–1.106 in)
B Standard(New):	104.00–104.30 mm (4.094–4.106 in)
C Standard(New):	6.550–6.560 mm (0.2579–0.2583 in)
C Service Limit:	6.52 mm (0.257 in)
D Standard(New):	1.65–1.95 mm (0.065–0.077 in)
D Service Limit:	1.45 mm (0.057 in)

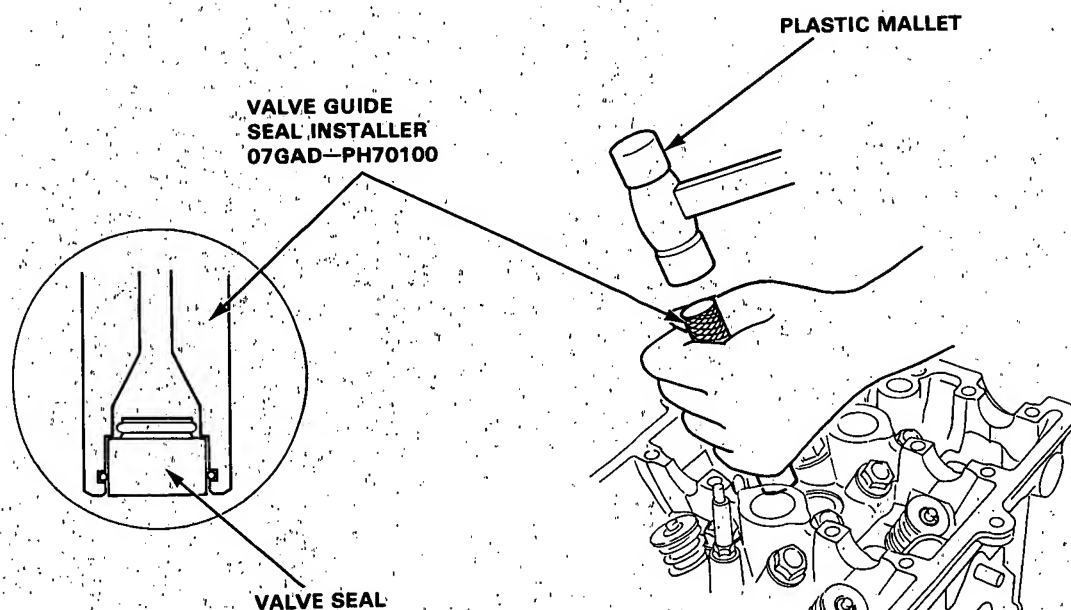
# Valves, Valve Spring and Valve Seals

## Valve Spring and Valve Seal Installation Sequence

NOTE: Exhaust and intake valve seals are NOT interchangeable.



NOTE: Install the valve spring seats before installing the valve seals.





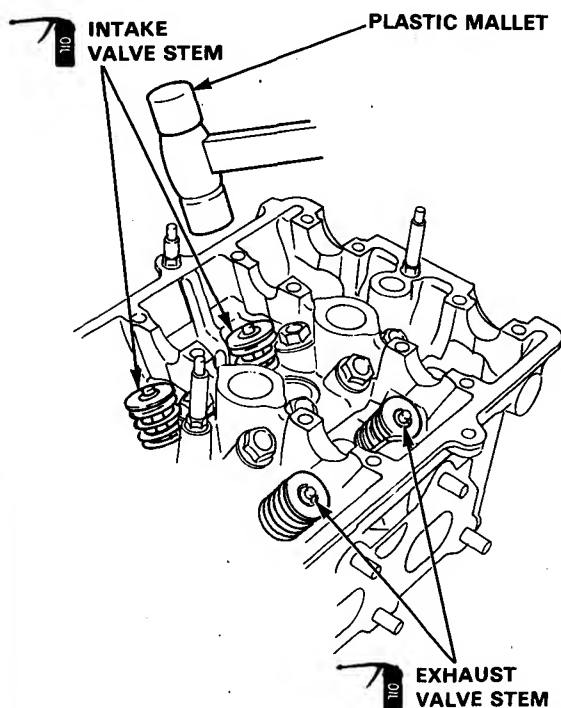


## Valve Guides

### Installation

- When installing valves in the cylinder head, coat valve stems with oil before inserting them into valve guides, and make sure valves move up and down smoothly.
- When valves and springs are in place, lightly tap the end of each valve stem two or three times to ensure proper seating of valves and valve keepers (use plastic mallet).

NOTE: Tap the valve stem only along its axis so you do not bend the stem.



### Valve Movement

Measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).

#### Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.04–0.10 mm

(0.002–0.004 in)

Service Limit: 0.16 mm (0.006 in)

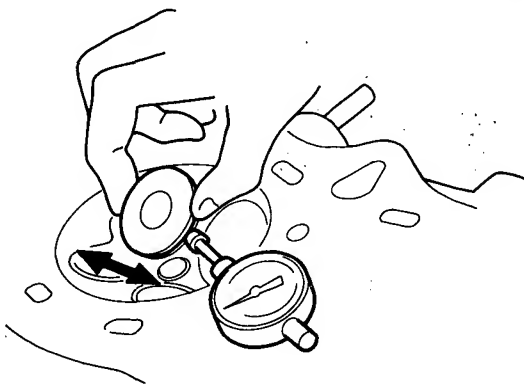
#### Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.10–0.16 mm

(0.004–0.006 in)

Service Limit: 0.22 mm (0.009 in)

Valve extended 10 mm out from seat.



- If measurement exceeds the service limit, recheck using a new valve.
- If measurement is now within the service limit, reassemble using a new valve.
- If measurement still exceeds limit, recheck using alternate method below, then replace valve and guide, if necessary.

NOTE: An alternate method of checking guide to stem clearance is to subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge.

Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit

#### Intake Valve Stem-to-Guide Clearance:

Standard(New): 0.02–0.05 mm

(0.001–0.002 in)

Service Limit: 0.08 mm (0.003 in)

#### Exhaust Valve Stem-to-Guide Clearance:

Standard(New): 0.05–0.08 mm

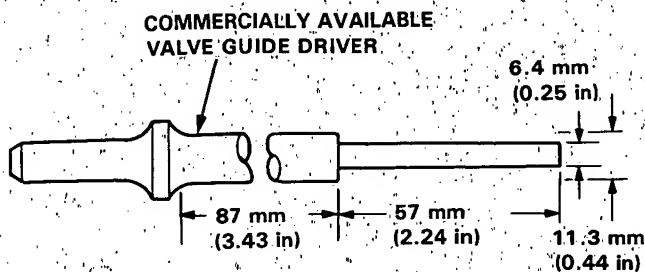
(0.002–0.003 in)

Service Limit: 0.11 mm (0.004 in)

# Valve Guides

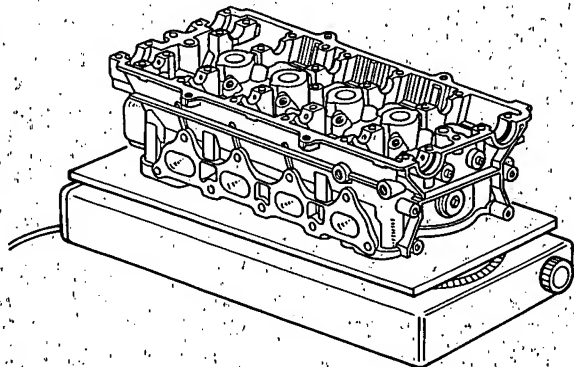
## Replacement

1. As illustrated in the removal steps of this procedure, use a commercially—available air-impact driver attachment modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the Valve Guide Driver and a conventional hammer.



Removal and Installation  
VALVE GUIDE DRIVER, 6.6 mm  
07942-6570100

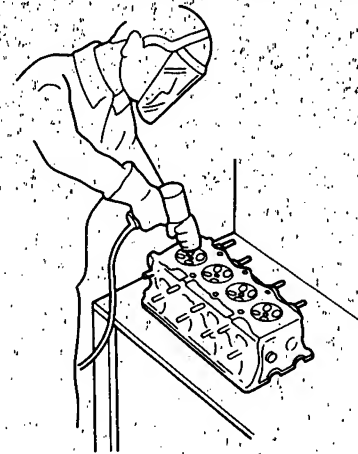
2. Select the proper replacement guides and chill them in the freezer section of a refrigerator for about an hour.
3. Use a hot plate or oven to evenly heat the cylinder head to 300°F (150°C). Monitor the temperature with a cooking thermometer.



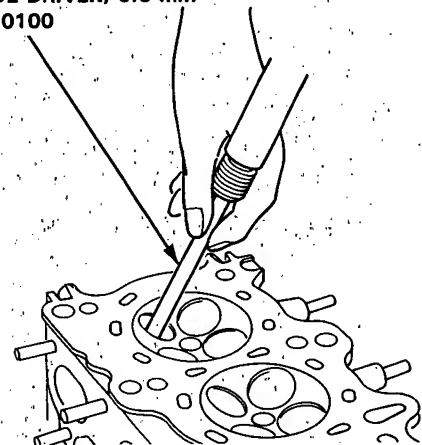
### CAUTION:

- Do not use a torch; it may warp the head.
- Do not get the head hotter than 300°F (150°C); excessive heat may loosen the valve seats.
- To avoid burns, use heavy gloves when handling the heated cylinder head.

4. Working from the camshaft side, use the driver and an air hammer to drive the guide about 2 mm towards the combustion chamber. This will knock off some of the carbon and make removal easier.



VALVE GUIDE DRIVER, 6.6 mm  
07942-6570100



### CAUTION:

- Always wear safety goggles or a face shield when using the air hammer.
- Hold the air hammer directly in line with the valve guide to prevent damaging the driver.

5. Turn the head over and drive the guide out toward the camshaft side of head.

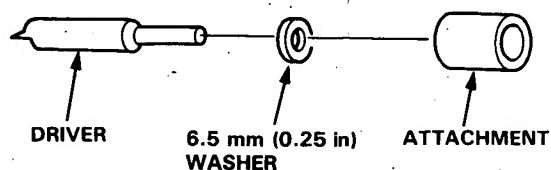
If a valve guide still won't move, drill it out with a 8 mm (5/16 in) bit, then try again.

**CAUTION:** Drill guides only in extreme cases; you could damage the cylinder head if the guide breaks.

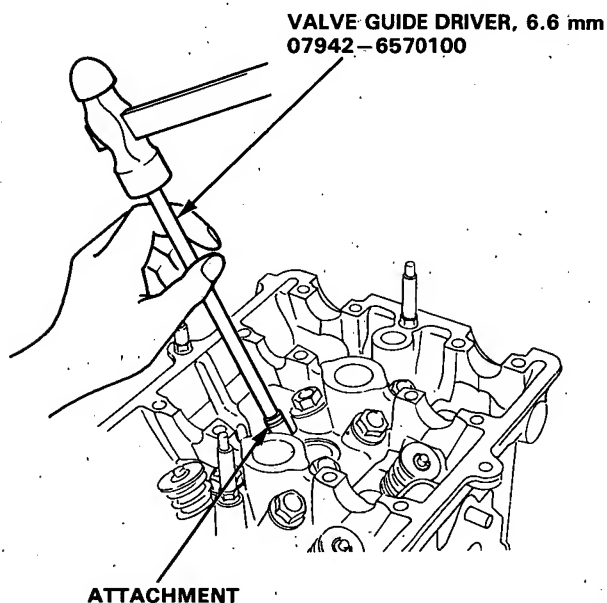
6. Remove the new guide(s) from the refrigerator, one at a time, as you need them.



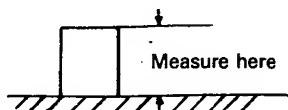
7. Slip a 6.5 mm (0.25 in) steel washer and the correct driver attachment over the end of the driver (The washer will absorb some of the impact and extend the life of the driver).



8. Install the new guide(s) from the camshaft side of the head; drive each one in until the attachment bottoms on the head. If you have all sixteen guides to do, you may have to reheat the head one or two more times.



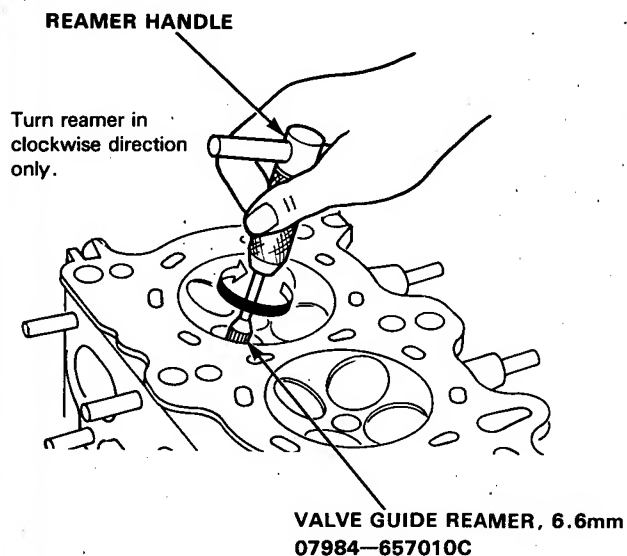
**Valve Guide Installed Height:**  
Intake: 14.0 mm (0.55 in)  
Exhaust: 16.0 mm (0.63 in)



## Reaming

**NOTE:** For new valve guides only.

1. Coat both reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise the full length of the valve guide bore.
3. Continue to rotate the reamer clockwise while removing it from the bore.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check clearance with a valve (page 6-15).
  - Verify that the valve slides in the intake and exhaust valve guides without exerting pressure.



# Valve Seats

## Reconditioning

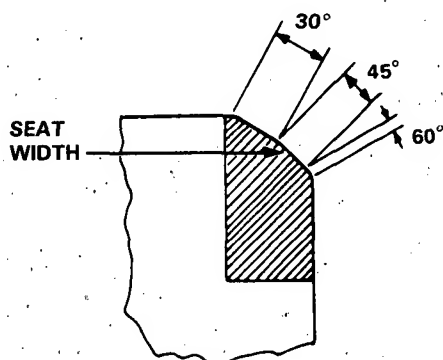
1. Renew the valve seats in the cylinder head using a valve seat cutter.

NOTE: If guides are worn (page 6-15), replace them (page 6-16) before cutting the valve seats.

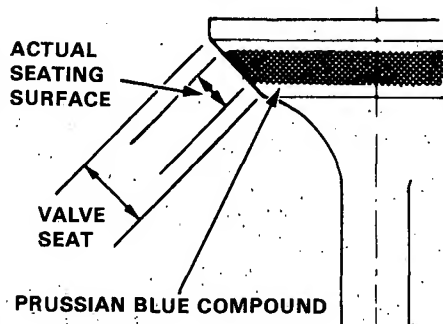
2. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
3. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 60° cutter. Check width of seat and adjust accordingly.
4. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutters.

### Valve Seat Width (Intake and Exhaust):

Standard: 1.25–1.55 mm (0.049–0.061 in)  
Service Limit: 2.0 mm (0.08 in)



5. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound to the valve face, and insert valve in original location in the head, then lift it and snap it closed against the seat several times.



6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.

- If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
- If it is too low (closer to the valve edge), you must make a second cut with the 30° cutter to move it up, then one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

7. Insert intake and exhaust valves in the head and measure valve stem installed height.

### Intake Valve Stem Installed Height:

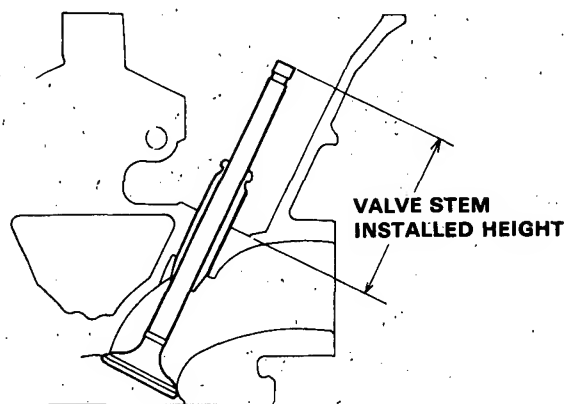
Standard(New): 40.765–41.235 mm  
(1.6049–1.6234 in)

Service Limit: 41.485 mm (1.6333 in)

### Exhaust Valve Stem Installed Height:

Standard(New): 42.765–43.235 mm  
(1.6837–1.7022 in)

Service Limit: 43.485 mm (1.7120 in)



8. If valve stem installed height is over the service limit, replace valve and recheck. If still over the service limit, replace cylinder head; the valve seat in the head is too deep.

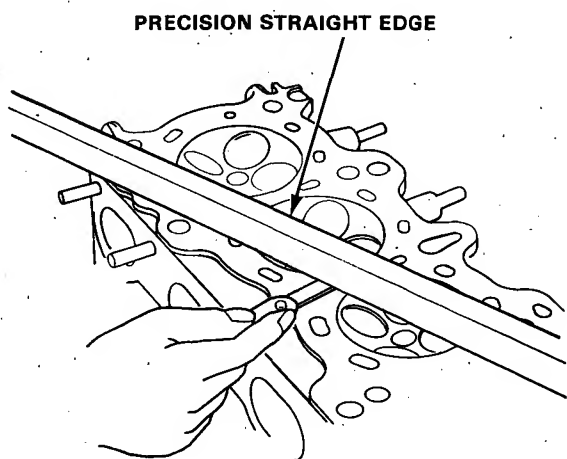
# Cylinder Head

## Warpage

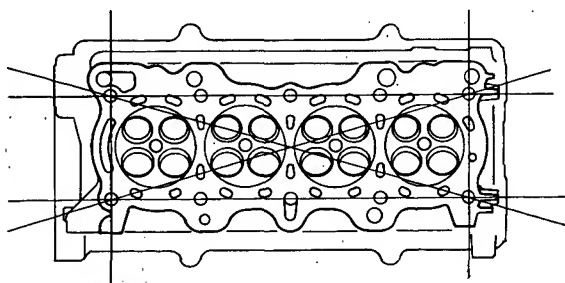
NOTE: If camshaft-to-holder oil clearances (page 6-12) are not within specification, the head cannot be resurfaced.

If camshaft-to-holder oil clearances are within specifications, check the head for warpage.

- If warpage is less than 0.05 mm (0.002 in) cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.002 in) and 0.2 mm (0.008 in), resurface cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 132.0 mm (5.20 in).



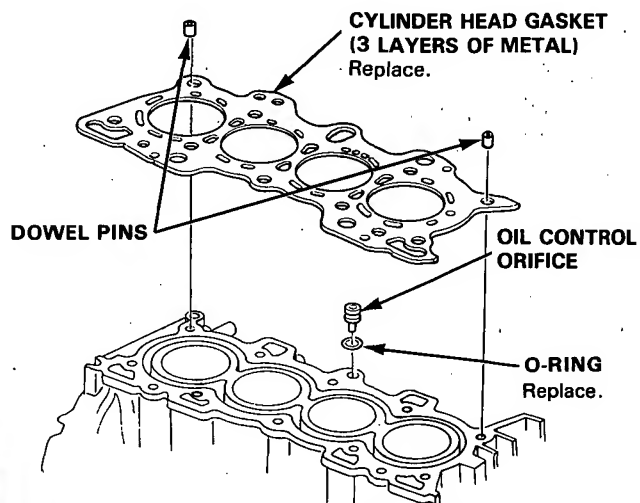
Measure along edges, and 3 ways across center.



Cylinder Head Height:  
Standard(New): 131.95–132.05 mm  
(5.195–5.199 in)

## Installation

1. Install the cylinder head in the reverse order of removal:
  - Always use a new head gasket.
  - Cylinder head and engine block surface must be clean.
  - "UP" mark on the timing belt pulleys should be at the top.
2. Cylinder head dowel pins and the oil control orifice must be aligned.
  - When handling a metal gasket, care should be taken not to fold it or damage the contact surface of the gasket.
  - Remove and clean the oil control orifice whenever the cylinder head is removed.

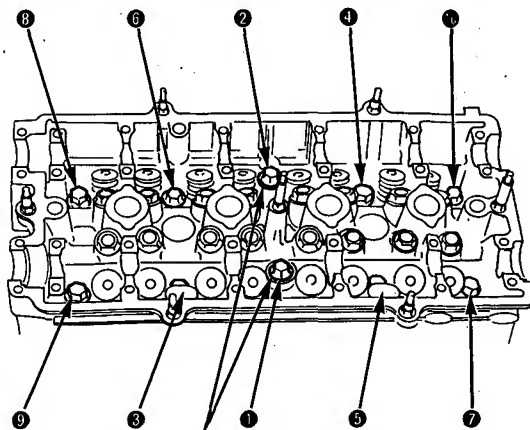


3. Tighten the cylinder head bolts in two steps. In the first step tighten all bolts, in sequence, to about 30 N·m (3.0 kg-m, 22 lb-ft); in the final step tighten, in the same sequence, to 85 N·m (8.5 kg-m, 61 lb-ft).

### NOTE:

- Apply engine oil to the cylinder head bolts and the washers.
- Use the longer bolts at positions No.1 and No.2 as shown.

### CYLINDER HEAD BOLTS TORQUE SEQUENCE



NOTE: Put longer bolts here.

(cont'd)

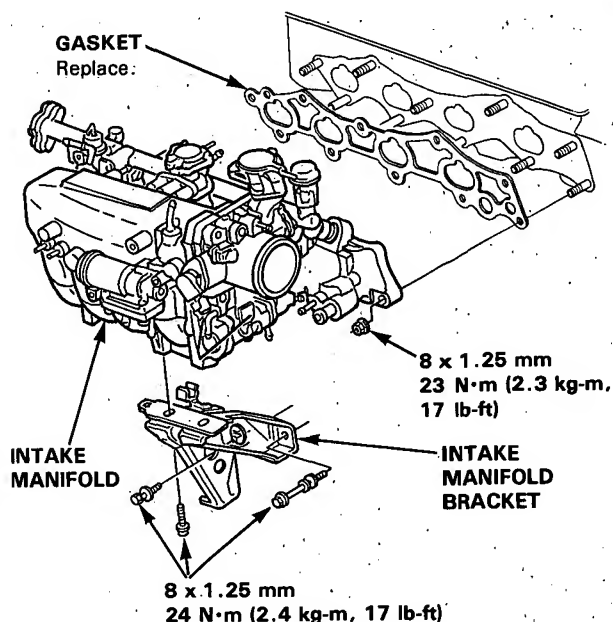
# Cylinder Head

## Installation (cont'd)

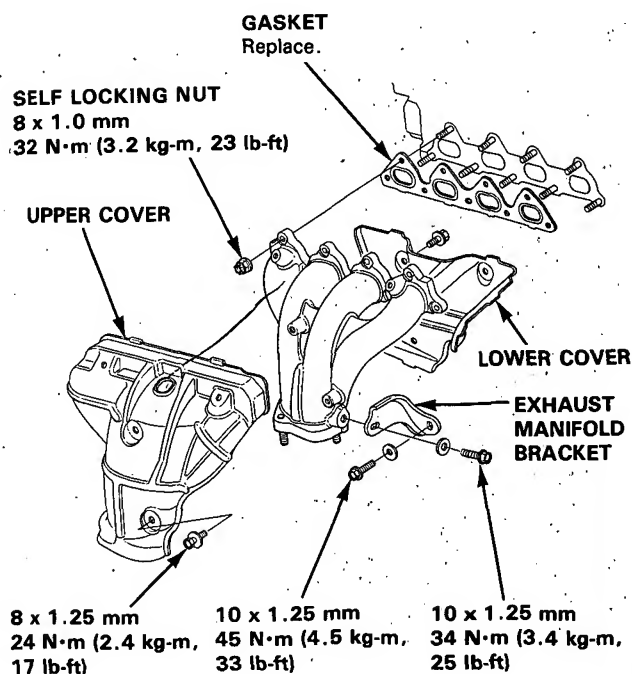
4. Install the intake manifold and tighten the nuts in a criss-cross pattern in 2 or 3 steps, beginning with the inner nuts.

**CAUTION:** Check for folds or scratches on the surface of the gasket. Replace with a new gasket if damaged.

5. Tighten the intake manifold bracket bolts.



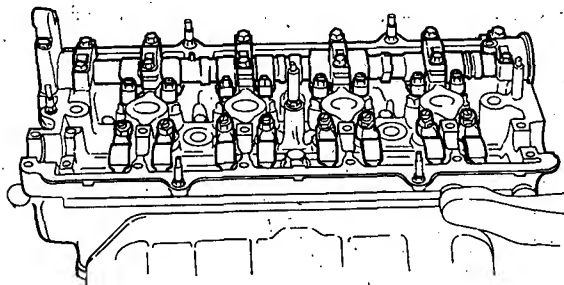
6. Install the exhaust manifold and bracket.
  - Use new self locking nuts.



### CAUTION:

- Make sure that the keyways on the camshafts are facing up and No. 1 cylinder is at top dead center (TDC).
- Valve locknuts should be loosened and adjusting screws backed off before installation.
- Replace the rocker arms in their original positions.

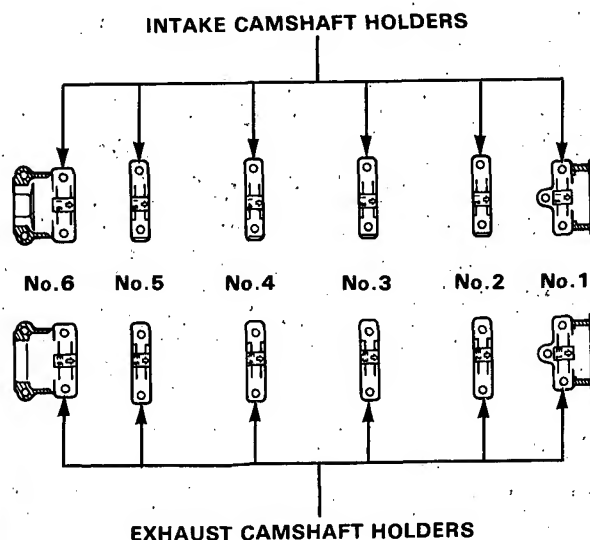
7. Place the rocker arms on the pivot bolts and the valve stems.



8. Install the camshafts and the camshaft seals with the open side (spring) facing in.

### NOTE:

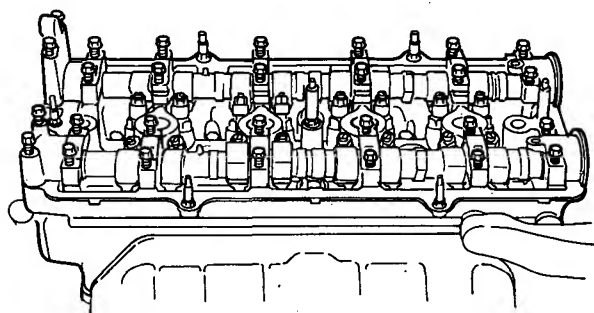
- "I" or "E" marks are stamped on the camshaft holders.
- Do not apply oil to the holder mating surface of camshaft seals.
- Apply liquid gasket to the shaded areas.
- The arrows marked on the camshaft holders should point to the timing belt.



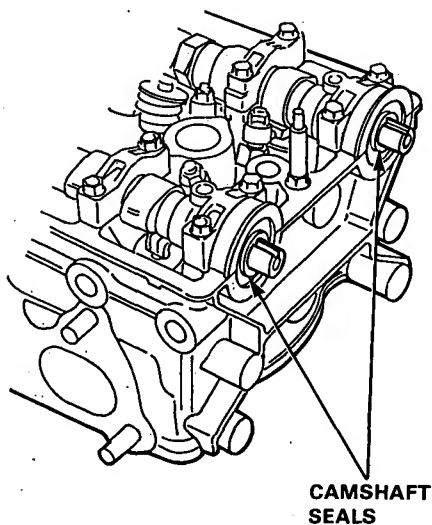
9. Apply liquid gasket to the head mating surfaces of the No. 1 and No. 6 camshaft holders, then install them, along with No. 2, 3, 4 and 5.



10. Tighten the camshaft holders temporarily.  
● Make sure that the rocker arms are properly positioned on the valve stems.

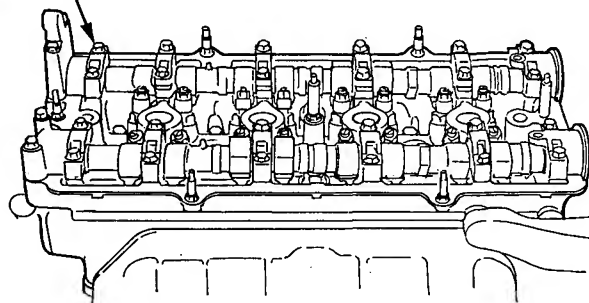


11. Press in the camshaft seals securely.



12. Tighten each bolt in two steps to ensure that the rockers do not bind on the valves.

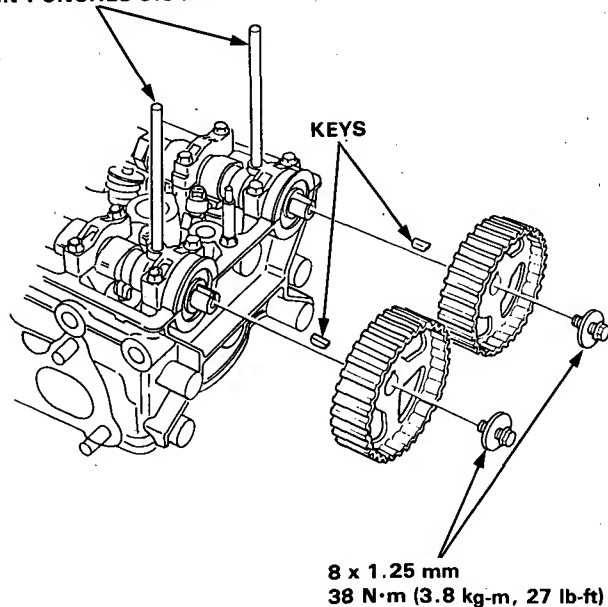
6 x 1.0 mm  
10 N·m (1.0 kg-m, 7 lb-ft)



13. Install keys into camshaft grooves.

NOTE: To set the camshafts at TDC position for No. 1 cylinder, align the holes in the camshafts with the holes in No. 1 camshaft holders and insert 5.0 mm pin punches in the holes.

PIN PUNCHES 5.0 mm



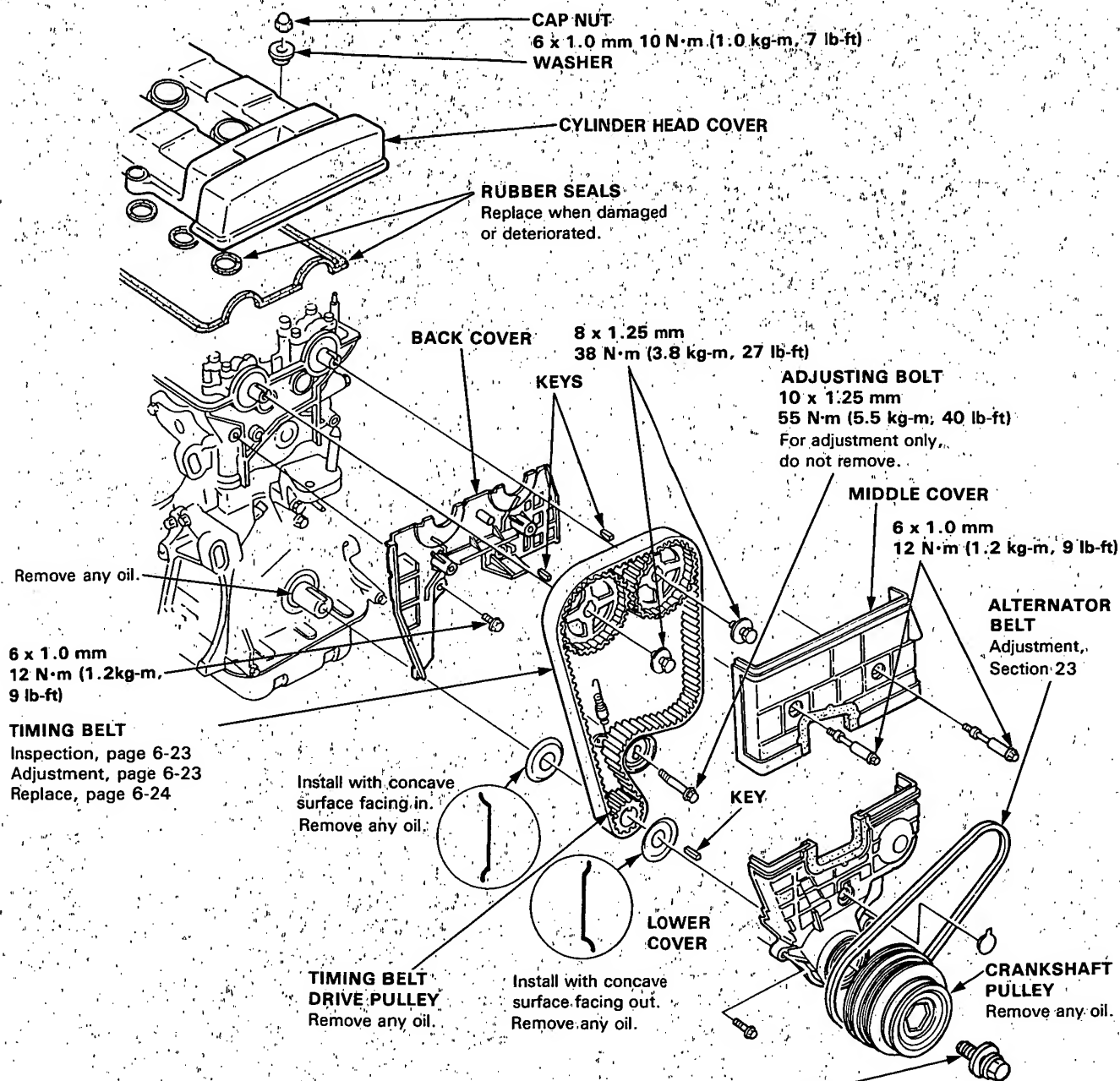
14. Push camshaft pulleys onto camshafts, then tighten the retaining bolts to the torque specified.  
15. Adjust the valve clearance (page 6-3).  
16. After the installation, check that all tubes, hoses and connectors are installed correctly.

# Timing Belt

## Illustrated Index

### NOTE:

- Refer to page 6-26 for positioning crankshaft and pulley before installing belt.
- Mark the direction of rotation on the belt before removing.



NOTE: When installing a new crankshaft and/or new bolt:

- ①tighten the crankshaft pulley bolt to 200 N·m (20.0 kg-m, 145 lb-ft),
- ②loosen bolt,
- ③retighten it to 180 N·m (18.0 kg-m, 130 lb-ft).



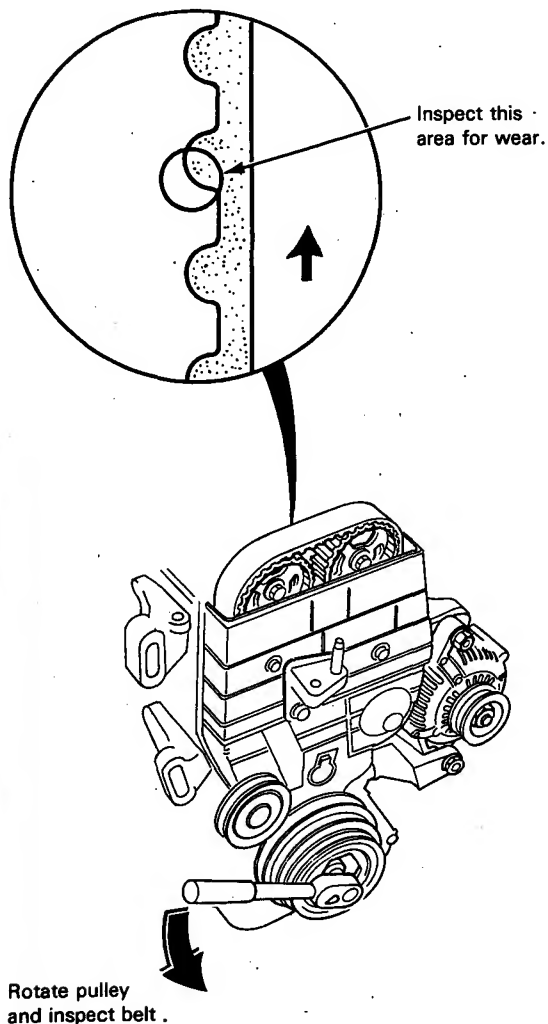


## Inspection

1. Remove the cylinder head cover.
2. Remove the middle cover.
3. Inspect the timing belt for cracks and oil soaking.

### NOTE:

- Replace the belt if oil soaked.
- Remove any oil or solvent that gets on the belt.



4. After inspecting, retorque the crankshaft pulley bolt to 180 N·m (18.0 kg-m, 130 lb-ft).

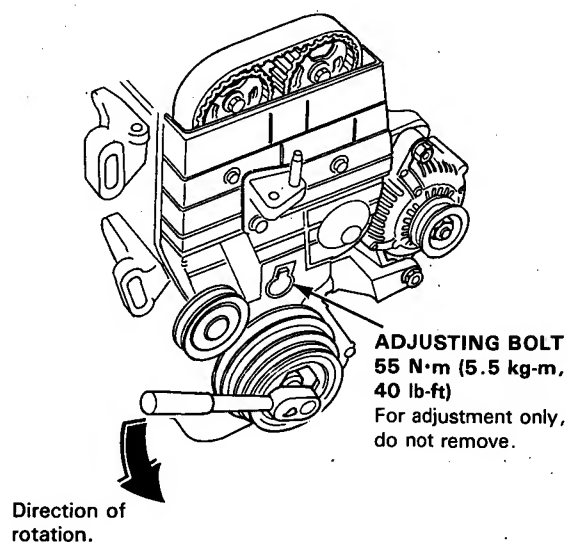
## Tension Adjustment

**CAUTION:** Always adjust timing belt tension with the engine cold.

### NOTE:

- The tensioner is spring-loaded to apply proper tension to the belt automatically after making the following adjustment.
- Always rotate the crankshaft counterclockwise when viewed from the pulley side. Rotating it clockwise may result in improper adjustment of the belt tension.

1. Remove the cylinder head cover.
2. Set the No. 1 piston at (TDC) (page 6-26).



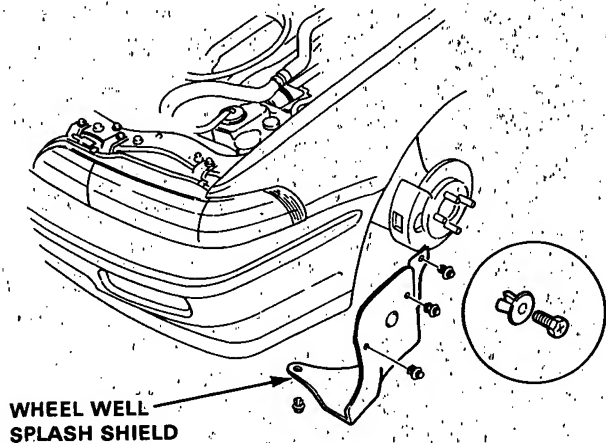
3. Rotate the crankshaft counterclockwise 3-teeth on the camshaft pulley, then loosen the adjusting bolt to create tension on the timing belt.
4. Tighten the adjusting bolt.
5. After adjusting, retorque the crankshaft pulley bolt to 180 N·m (18.0 kg-m, 130 lb-ft).

# Timing Belt

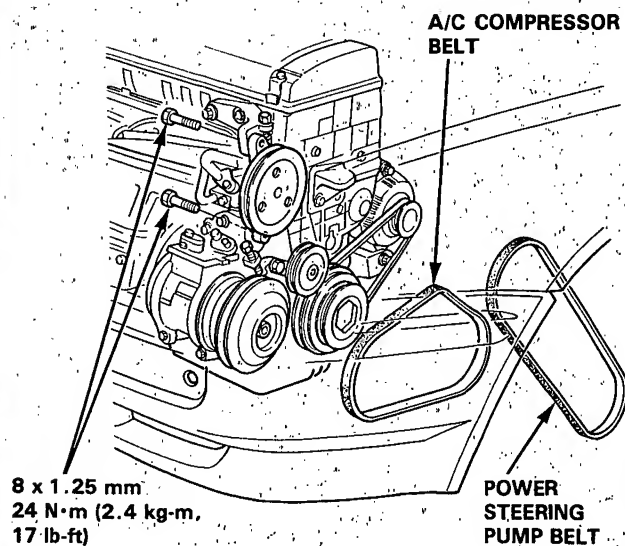
## Replacement

**NOTE:** Turn the crankshaft pulley so that the No. 1 piston is at top dead center (TDC) before removing the belt (page 6-26).

1. Remove the wheel well splash shield.



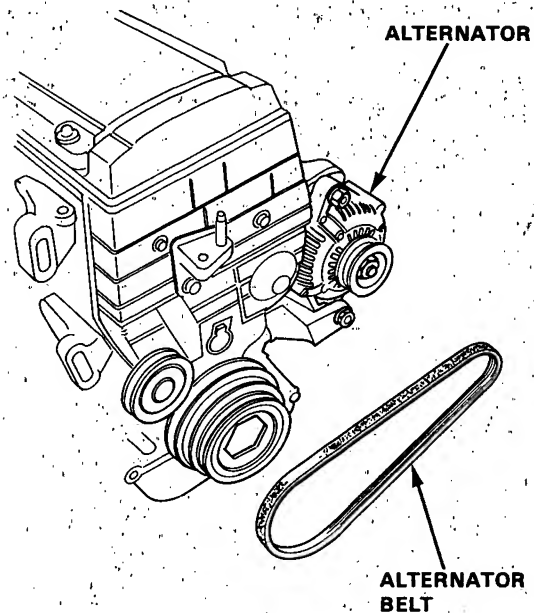
2. Remove the power steering pump belt and power steering pump.
  - Do not disconnect the power steering hoses.
3. Remove the air conditioning (A/C) compressor belt (standard for some types).



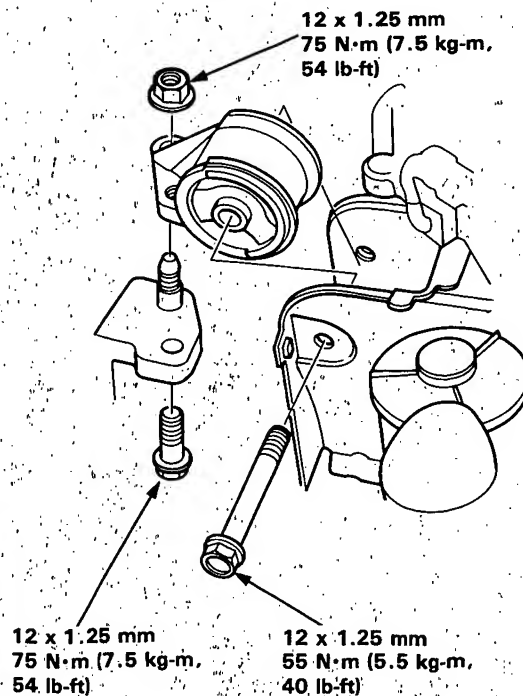
4. Remove the alternator belt.

**NOTE:** After installation, adjust the tension of each belt.

- See section 23 for alternator belt tension adjustment.
- See section 22 for A/C compressor belt tension adjustment.
- See section 17 for power steering belt tension adjustment.



5. Remove the engine support bolts and nut, then remove the side engine mount.



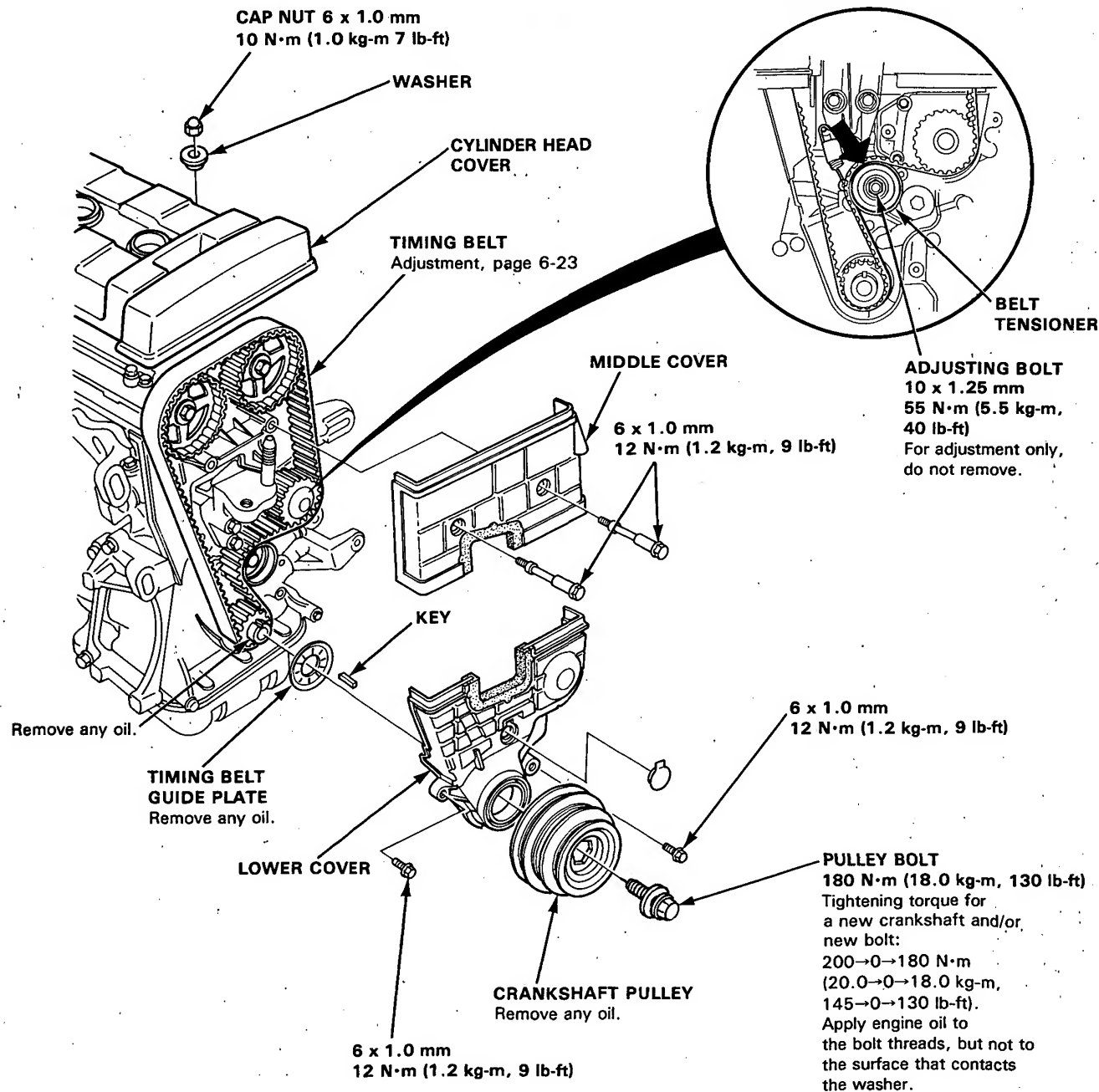


6. Remove the cylinder head cover.
7. Remove the middle cover.
8. Remove the pulley bolt and crankshaft pulley.
9. Remove the lower cover.
10. Loosen the adjusting bolt, push the tensioner to remove tension from the timing belt, then retighten the bolt.
11. Remove the timing belt.

**NOTE:** When installing a new crankshaft and/or new bolt:

- ①tighten the crankshaft pulley bolt to 200 N·m (20 kg-m, 145 lb-ft),
- ②loosen bolt,
- ③retighten it to 180 N·m (18.0 kg-m, 130 lb-ft).

**NOTE:** Push the tensioner pulley to loosen the belt.



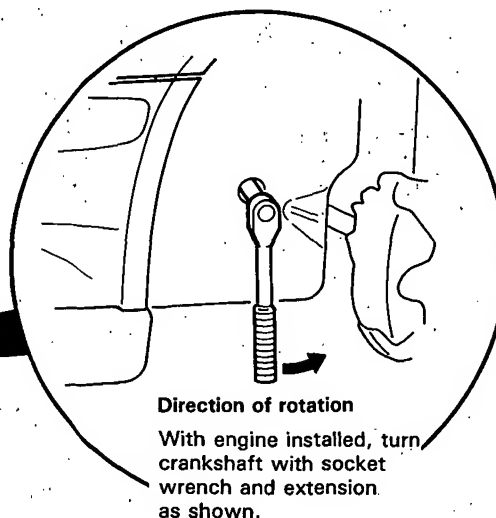
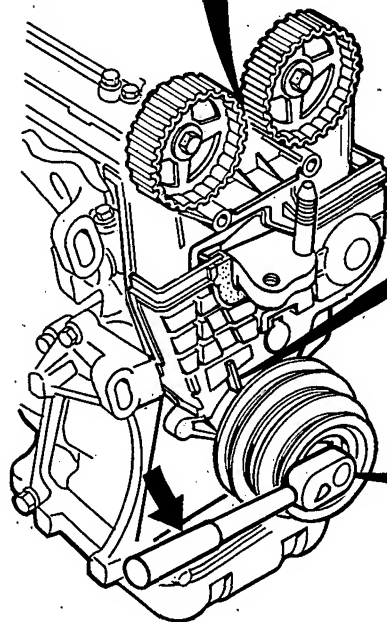
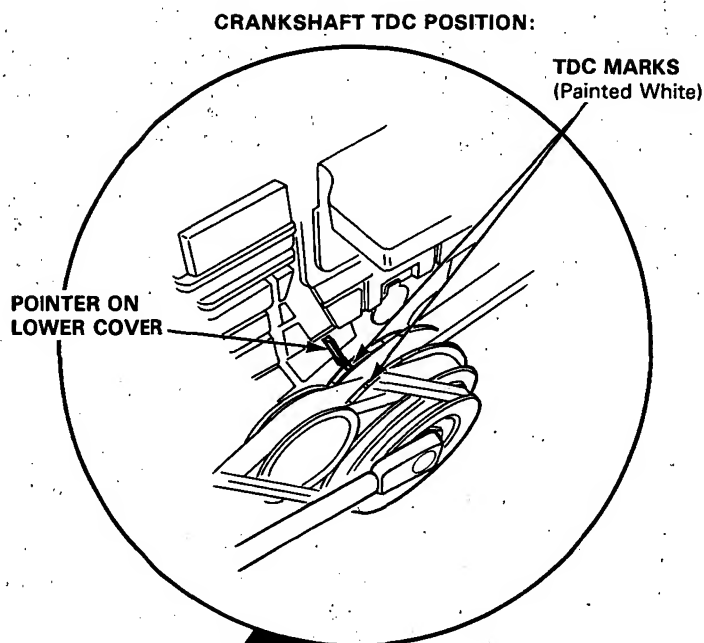
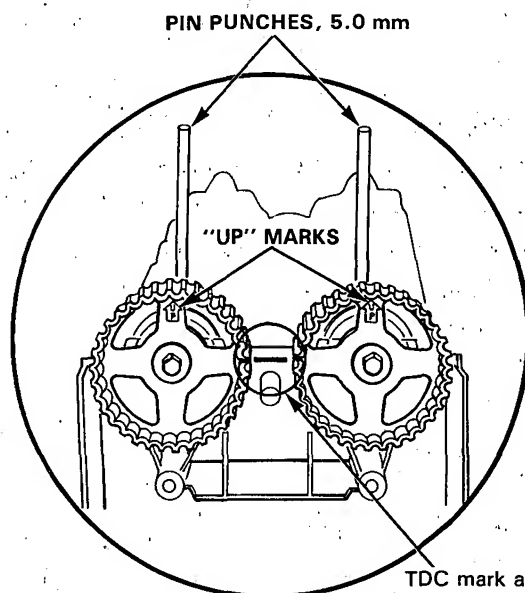
12. Install in reverse order of removal; adjust the valve clearances (page 6-3).
  - Refer to page 6-26 for positioning crankshaft and pulley before installing the new belt.
13. Perform the timing belt tension adjustment (page 6-23).

# Timing Belt

## Positioning Crankshaft Before Installing Timing Belt

### NOTE:

- Install the timing belt with the No. 1 piston at top dead center (TDC).
- To set the camshafts to TDC position for No. 1 cylinder, align the hole in the camshafts with the holes in the No. 1 camshaft holders and insert 5.0 mm pin punches into the holes.
- After setting, retorque the crank pulley bolt to 180 N·m (18.0 kg-m, 130 lb-ft).



### NOTE:

- To set the crankshaft to TDC, install the timing belt guide plates, timing belt drive pulley, timing belt lower cover, crankshaft pulley, and crankshaft pulley bolt.

# Cylinder Head/Valve Train

## B17A1 engine

Special Tools .....	6-28	Camshafts Inspection .....	6-51
VTEC		Valves, Valve Springs and Valve Seals	
Troubleshooting Flowchart		Removal .....	6-53
VTEC Solenoid Valve .....	6-30	Valve Spring and Valve Seal Installation Sequence .....	6-55
VTEC Pressure Switch .....	6-32	Valve Installation .....	6-56
VTEC Solenoid Valve Inspection ...	6-35	Valve Guides	
Rocker Arms		Valve Movement .....	6-56
Manual Inspection .....	6-36	Replacement .....	6-57
Inspection Using Special		Reaming .....	6-58
Tools .....	6-37	Valve Seats Reconditioning .....	6-59
Valve Clearance Adjustment .....	6-38	Timing Belt	
Illustrated Index .....	6-40	Illustrated Index .....	6-64
Cylinder Head		Inspection .....	6-65
Removal .....	6-42	Tension Adjustment .....	6-65
Warpage .....	6-60	Removal .....	6-66
Installation .....	6-61	Installation .....	6-68
Rocker Arms			
Removal .....	6-46		
Locations .....	6-47		
Inspection .....	6-48		
Arm-to-Shaft Clearance .....	6-49		
Installation .....	6-50		

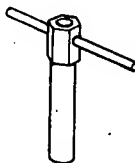


# Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07HAH—PJ7010A or 07HAH—PJ7010B	Valve Guide Reamer, 5.5 mm	1	6-58
②	07LAA—PR30100	Tappet Adjuster Wrench	1	6-38
③	07LAJ—PR3020A	Air Stopper	1	6-37
④	07MAF—PR9010A	Valve Spring Compressor Attachment Extension	1	6-53
⑤	07742—0010100	Valve Guide Driver, 5.5 mm	1	6-57, 58
⑥	07757—PJ1010A	Valve Spring Compressor Attachment	1	6-53



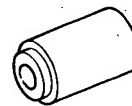
①



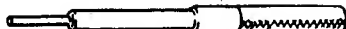
②



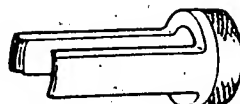
③



④



⑤



⑥



# VTEC

## Troubleshooting Flowchart — VTEC Solenoid Valve

**21**

Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 21: A problem in the VTEC Solenoid Valve circuit.

**21**

- MIL has been reported on.
- With service check connector jumped (page 11-40), Code 21 is indicated.

Do the engine control module (ECM) Reset Procedure (page 11-41).

Start the engine.

Warm up engine to normal operating temperature (the cooling fan comes on).

Do the Road Test.\*

**\*Road Test:**

Accelerate in 1st gear to an engine speed over 6000 rpm. Hold that engine speed for at least two seconds. Repeat this test at least three times.

Is MIL on and does it indicate code 21?

**NO**

Intermittent failure, system is OK at this time.  
Check for poor connections or loose wires at VTEC solenoid valve and ECM.

**YES**

Turn the ignition switch OFF.

Disconnect the 1P connector from the VTEC solenoid valve.

Check for continuity between 1P connector terminal and body ground.

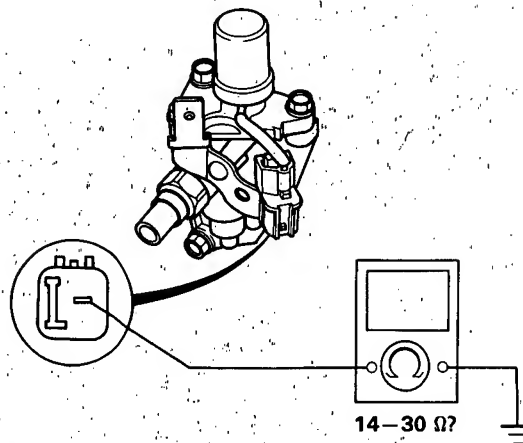
Is there 14–30  $\Omega$ ?

**NO**

Replace the VTEC solenoid valve.

**YES**

(To page 6-31)



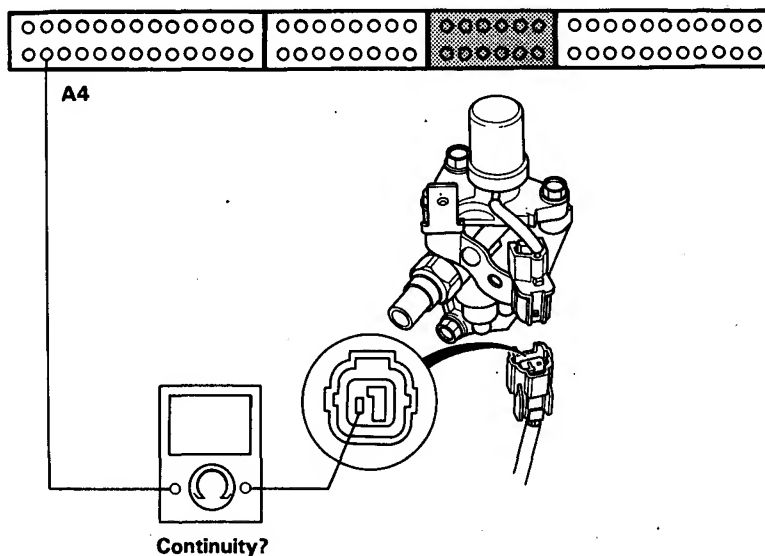




(From page 6-30)

Connect the ECM test harness.

Check for continuity between 1P connector terminal and A4 terminal.



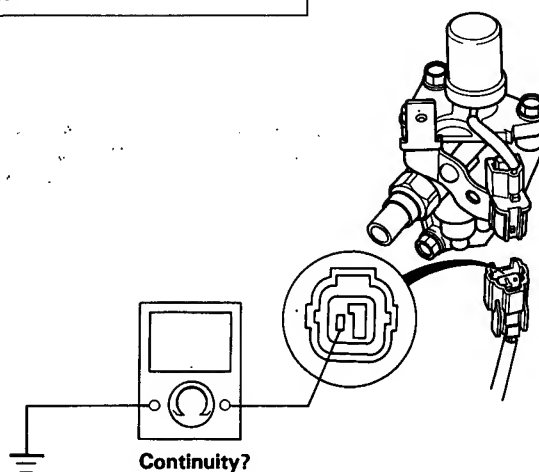
Does continuity exist?

NO

Repair open in wire between ECM and VTEC solenoid valve connector.

YES

Check for continuity between 1P connector terminal (harness side) and body ground.



Does continuity exist?

YES


Repair short in wire between ECM and VTEC solenoid valve connector.


NO

Substitute a known-good ECM and recheck. If symptom/indication goes away replace the original ECM.

# VTEC

## Troubleshooting Flowchart – VTEC Pressure Switch

 **22** Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 22: A problem in the VTEC Pressure Switch circuit.

 **22**

- MIL has been reported on.
- With service check connector jumped (page 11-40), code 22 is indicated.

Do the engine control module (ECM) Reset Procedure (page 11-41).

Start the engine.

Warm up engine to normal operating temperature (cooling fan comes on).

Do the Road Test. \*

\*Road Test:  
Accelerate in 1st gear to an engine speed over 6000 rpm.  
Hold that engine speed for at least two seconds.  
Repeat this test at least three times.

Is MIL on and does it indicate code 22?

NO

Intermittent failure, system is OK at this time.  
Check for poor connections or loose wires at VTEC pressure switch and ECM.

YES

Turn the ignition switch OFF.

Disconnect the 2P connector from the VTEC pressure switch.

Check for continuity between BLK terminal and body ground.

Does continuity exist?

NO

Repair open in BLK wire between 2P connector and body ground.

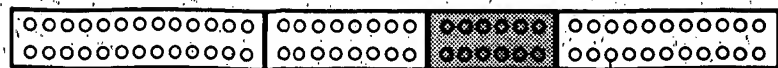
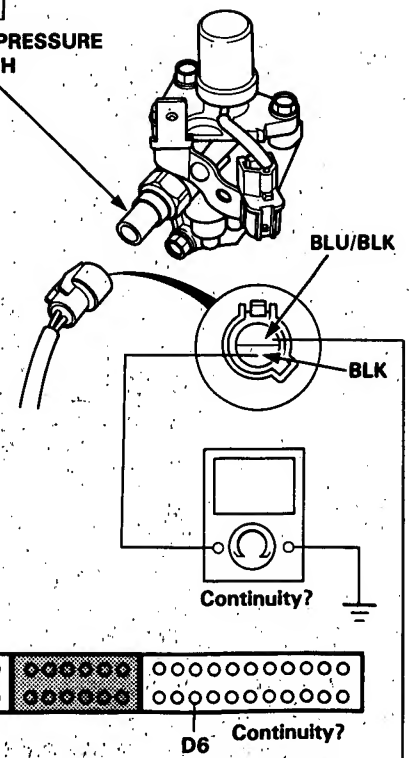
YES

Connect the ECM test harness.

Check for continuity between BLU/BLK terminal and D6 terminal.

(To page 6-33)

VTEC PRESSURE SWITCH





(From page 6-32)

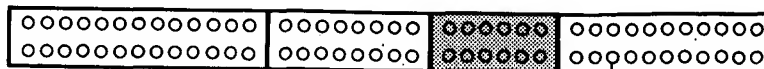
Does continuity exist?

NO

Repair open in BLU/BLK wire between ECM and 2P connector.

YES

Check for continuity between D6 terminal and body ground.



D6

Continuity?

Does continuity exist?

YES

Repair short in BLU/BLK wire between ECM and 2P connector.

NO

Remove 10 mm sealing bolt and connect oil pressure gauge.

Connect a tachometer (section 11).

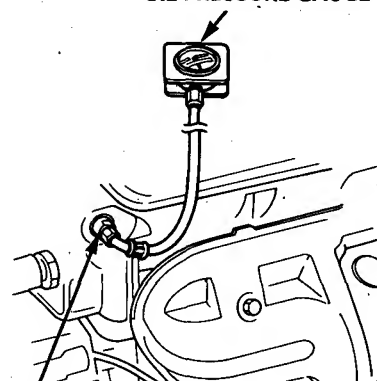
Start the engine and warm it up to normal operating temperature.

Check oil pressure at engine speeds of 1,000, 3,000 and 5,000 rpm.

**NOTE:**

Keep measuring time as short as possible because engine is running with no load (less than one minute).

COMMERCIALLY AVAILABLE OIL PRESSURE GAUGE



**GAUGE JOINT ADAPTOR  
SNAP-ON MT26-17  
10 x 1.0 mm**

• Use new washer when installing the sealing bolt.

Is pressure below 50 kPa (0.5 kg/cm<sup>2</sup>, 7 psi)?

NO

Inspect the VTEC solenoid valve.

YES

Turn off the engine. Check for continuity between the 2 terminals on the VTEC pressure switch.

Does continuity exist?

NO

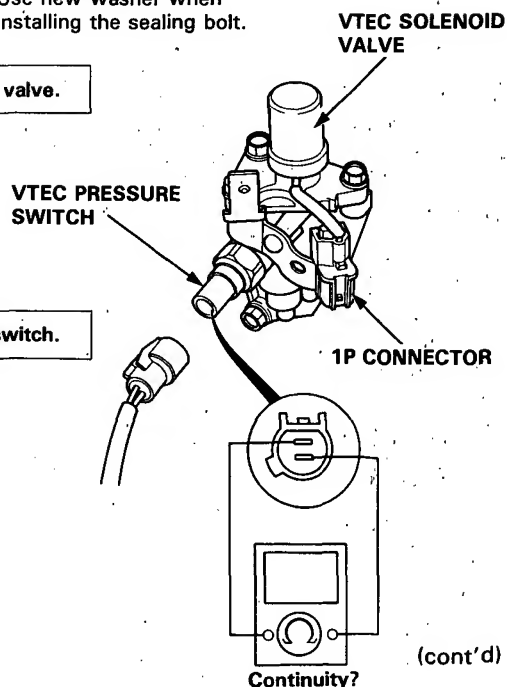
Relace the VTEC pressure switch.

YES

Disconnect the 1P connector from the VTEC solenoid valve.

Attach the battery positive terminal to the GRN/WHT terminal.

(To page 6-34)



(cont'd)

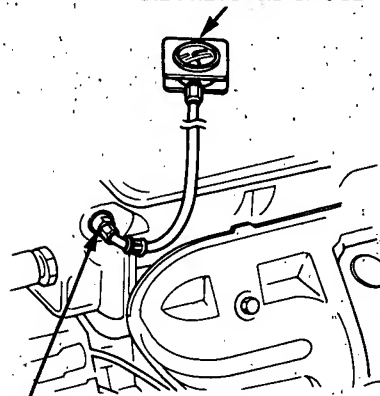
# VTEC

## Troubleshooting Flowchart — VTEC Pressure Switch (cont'd)

(From page 6-33)

Start the engine and check oil pressure at 5,000 rpm (for VTEC oil pressure test).

COMMERCIALLY AVAILABLE  
OIL PRESSURE GAUGE



GAUGE JOINT ADAPTOR  
SNAP-ON MT26-17  
10 x 1.0 mm

• Use new washer when  
installing the sealing bolt.

### NOTE:

Keep measuring time as short as possible because engine is running with no load (less than one minute).

Is pressure above 400 kPa (4 kg/cm<sup>2</sup>, 57 psi)?

NO

Inspect the VTEC solenoid valve.

YES

Check for continuity between the 2 terminals on the VTEC pressure switch under above condition.

Does continuity exist?

YES

Replace the VTEC pressure switch.

NO

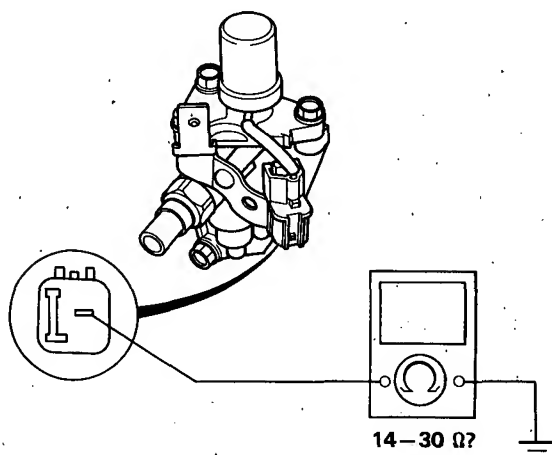
Substitute a known-good ECM and recheck. If symptom/indication goes away replace the original ECM.



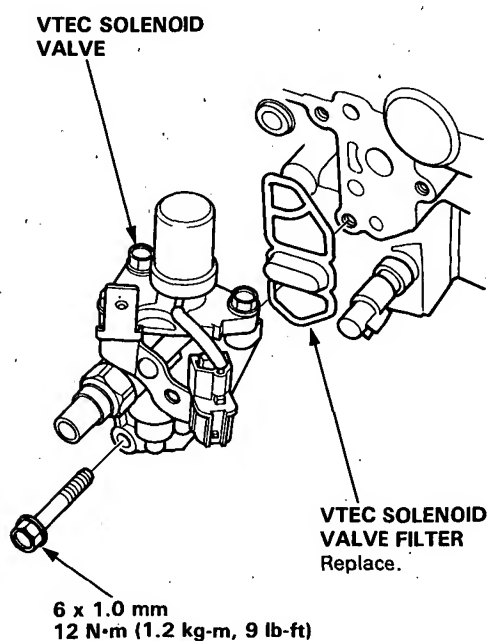
## VTEC Solenoid Valve Inspection

1. Disconnect the 1P connector from the VTEC solenoid valve.
2. Measure resistance between the terminal and body ground.

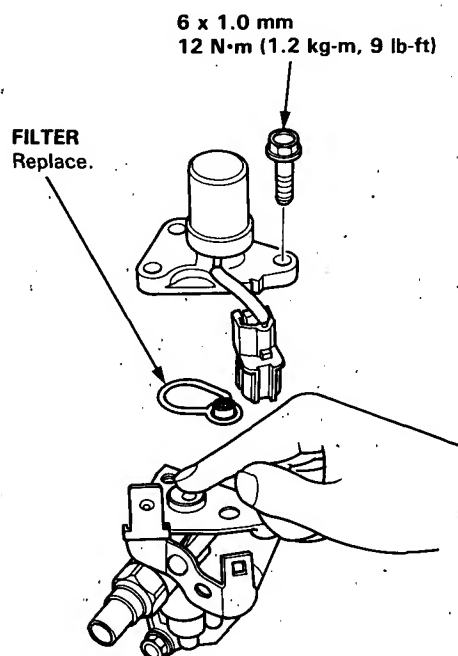
Resistance: 14–30  $\Omega$



3. If the resistance is within specifications, remove the VTEC solenoid valve from the cylinder head, and check the VTEC solenoid valve filter for clogging.
  - If there is clogging, replace the engine oil filter and the engine oil.



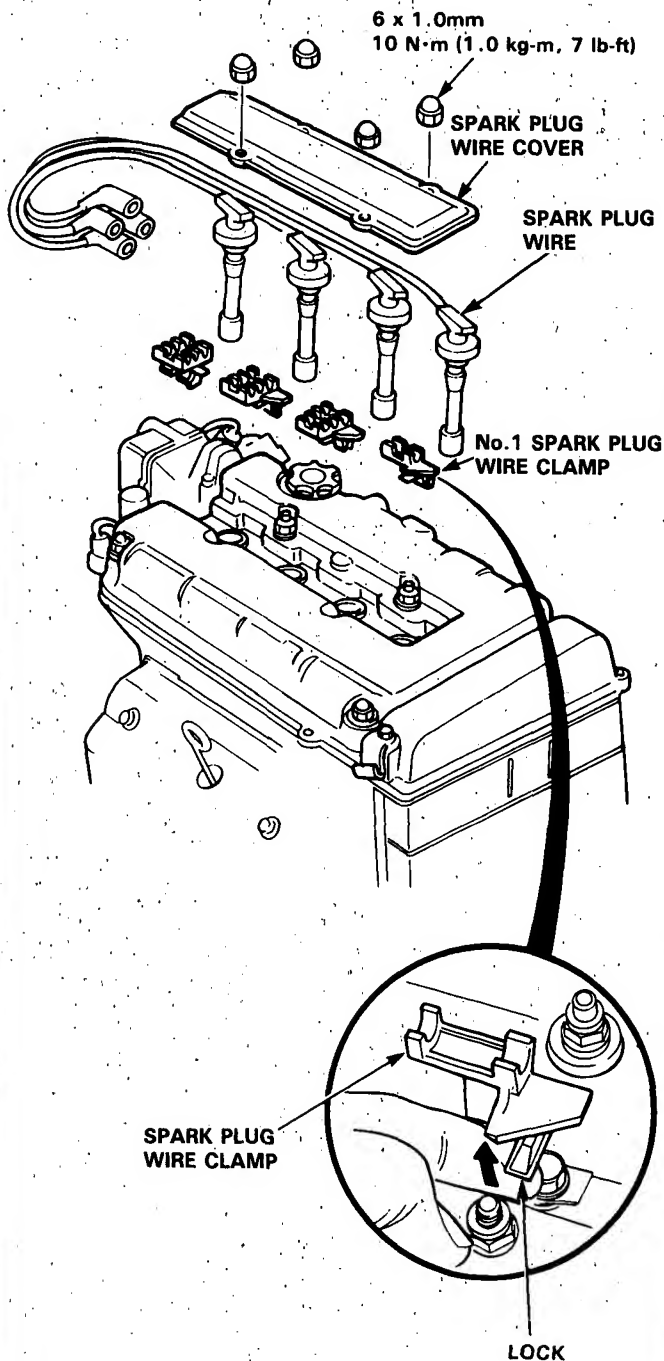
4. If the filter is not clogged, push the VTEC solenoid valve with your finger and check its movement.
  - If VTEC solenoid valve is normal, check the engine oil pressure.



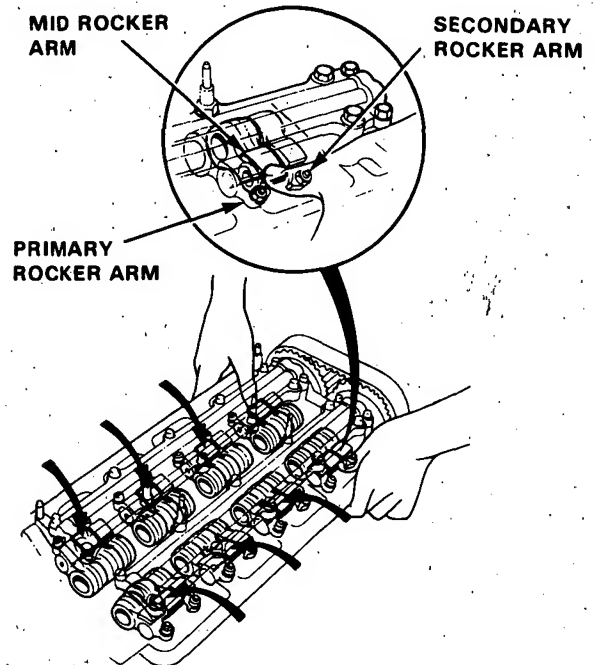
# VTEC

## Rocker Arms — Manual Inspection

1. Set the No. 1 cylinder at TDC.
2. Remove the spark plug wire cover and the spark plug wires.
3. Remove the spark plug clamps while pulling up on the lock.



4. Remove the cylinder head cover.
5. Push the mid rocker arm on the No. 1 cylinder manually.
6. Check that the mid rocker arm moves independently of the primary and secondary rocker arms.



7. Check the mid rocker arm of each cylinder at TDC.
  - If the mid rocker arm does not move, remove the mid, primary and secondary rocker arms as an assembly and check that the pistons in the mid and primary rocker arms move smoothly.
  - If any rocker arm needs replacing, replace the primary, mid, and secondary rocker arms as an assembly.

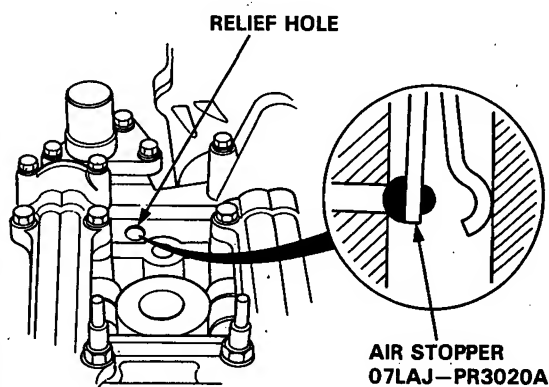


## Rocker Arms — Inspection Using Special Tools

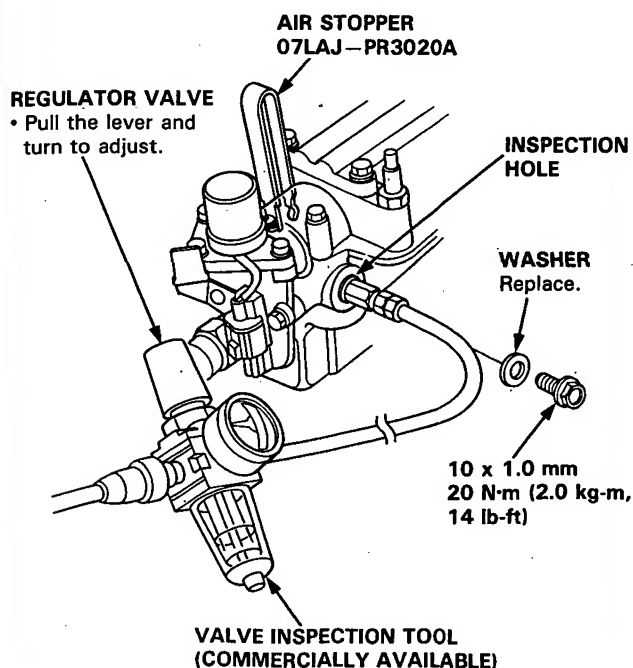
### CAUTION:

- Before using the valve inspection tool, make sure that the air pressure gauge on the air compressor indicates over 250 kPa (2.5 kg/cm<sup>2</sup>, 36 psi).
- Inspect the valve clearance before rocker arm inspection.
- Cover the timing belt with a shop towel to prevent getting oil on the belt.
- Check the mid rocker arm of each cylinder at TDC.

1. Remove the cylinder head cover.
2. Plug the relief hole with the special tool (Air Stopper).



3. Remove the bolt and washer from the inspection hole and connect the valve inspection tool.

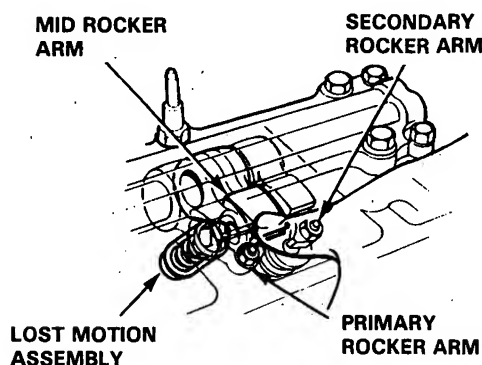


4. Apply specified air pressure to the rocker arm pistons after loosening the regulator valve on the valve inspection set.

### Specified Air Pressure:

250 kPa (2.5 kg/cm<sup>2</sup>, 36 psi)  
— 500 kPa (5.0 kg/cm<sup>2</sup>, 71 psi)

5. Make sure that the intake primary and secondary rocker arms are mechanically connected by the pistons and that the mid rocker arms do not move when pushed manually.



- If any mid rocker arm moves independently of the primary and secondary rocker arms, replace the rocker arms as a set.

6. Remove the tools.
7. Check the operation of the lost motion assembly by pushing on the mid rocker arm. The lost motion assembly should compress fully and operate smoothly through its full stroke. Replace the assembly if it does not work smoothly.
8. After inspection, check that the Malfunction Indicator Lamp (MIL) does not come on.

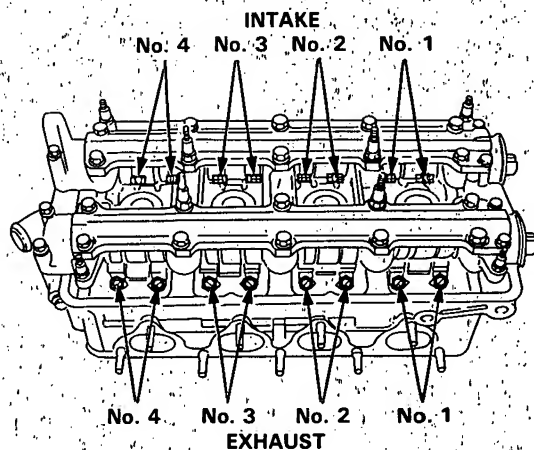
# Valve Clearance

## Adjustment

### NOTE:

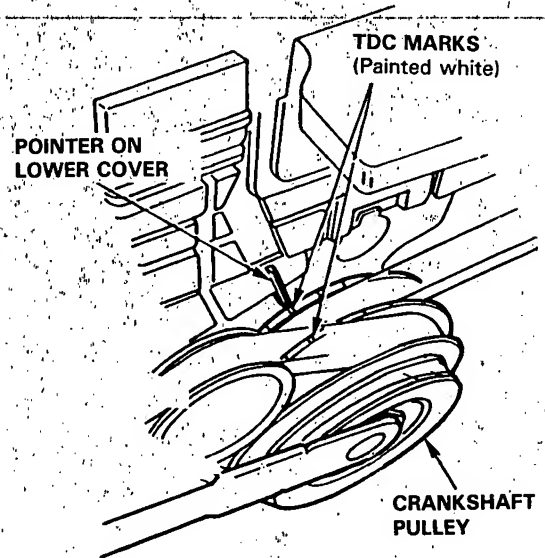
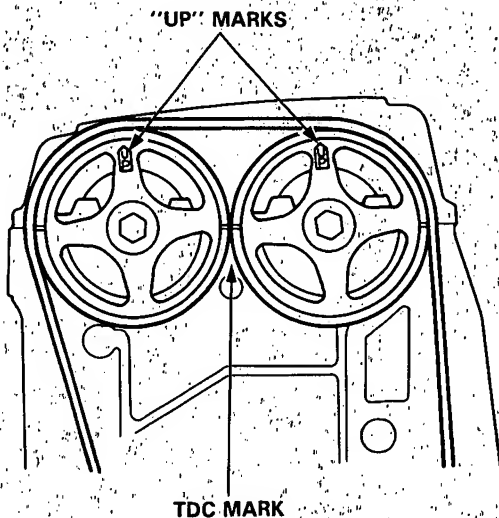
- Valves should be adjusted cold; the cylinder head temperature is less than 100°F (38°C).
- Adjustment is the same for intake and exhaust valves.
- After adjusting, retorque the crankshaft pulley bolt to 180 N·m (18.0 kg·m, 130 lb·ft).

1. Remove cylinder head cover.



2. Set No. 1 piston at TDC "UP" mark on the pulley should be at top, and TDC grooves on the pulley should align with the pointer on back cover. TDC grooves (white paint) on the crankshaft pulley should align with pointer on the timing belt lower cover.

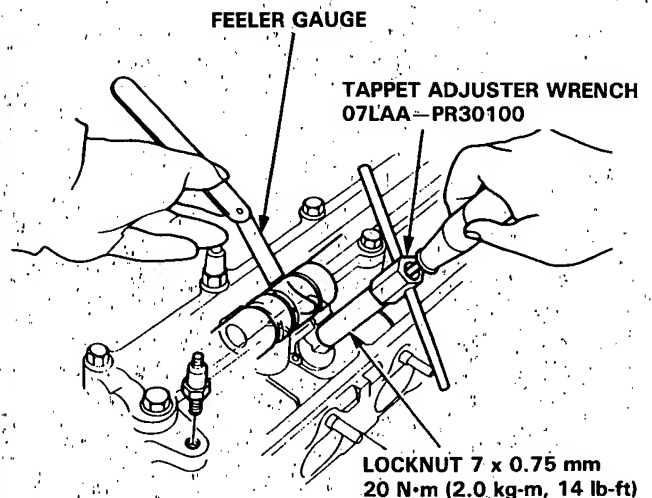
Number 1 piston at TDC



3. Adjust valve clearance on No. 1 cylinder.

Intake: 0.15–0.19 mm (0.006–0.007 in)  
Exhaust: 0.17–0.21 mm (0.007–0.008 in)

4. Loosen the locknut and turn the adjusting screw until feeler gauge slides back and forth with a slight amount of drag.

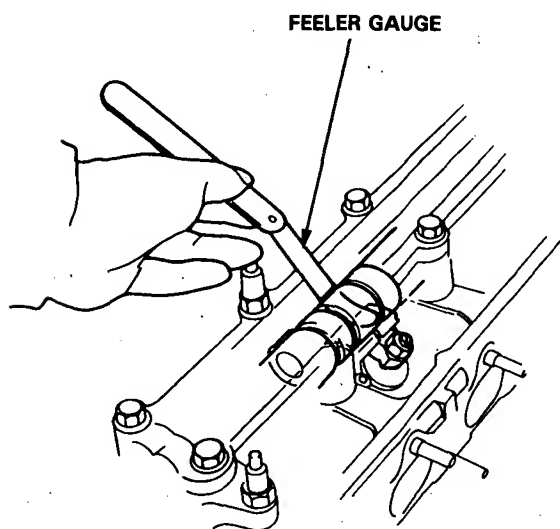


LOCKNUT 7 x 0.75 mm  
20 N·m (2.0 kg·m, 14 lb·ft)



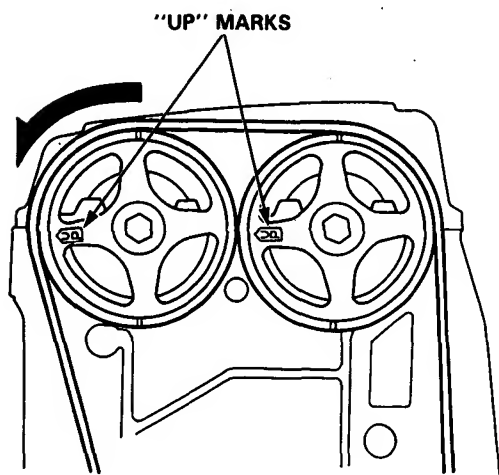


5. Tighten the locknut and recheck clearance again. Repeat adjustment if necessary.



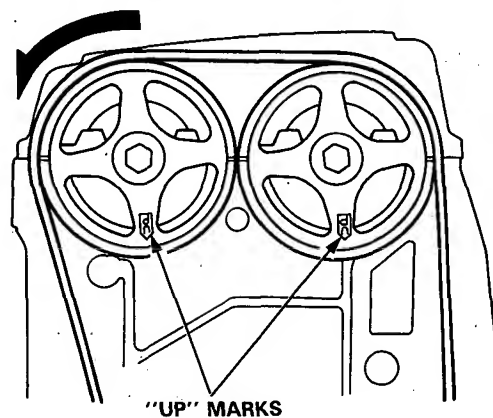
6. Rotate the crankshaft 180° counterclockwise (camshaft pulley turns 90°). The "UP" mark should be on the exhaust side. Adjust valves on No. 3 cylinder.

Number 3 piston at TDC



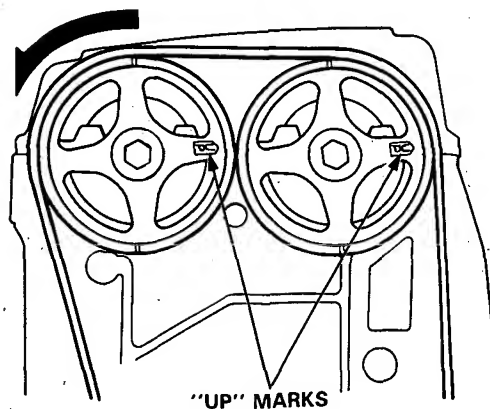
7. Rotate crankshaft 180° counterclockwise to bring No. 4 piston to TDC. Both TDC grooves are once again visible. Adjust valves on No. 4 cylinder.

Number 4 piston at TDC



8. Rotate crankshaft 180° counterclockwise to bring No. 2 piston to TDC. The "UP" marks should be on the intake side. Adjust valves on No. 2 cylinder.

Number 2 piston at TDC



# Illustrated Index

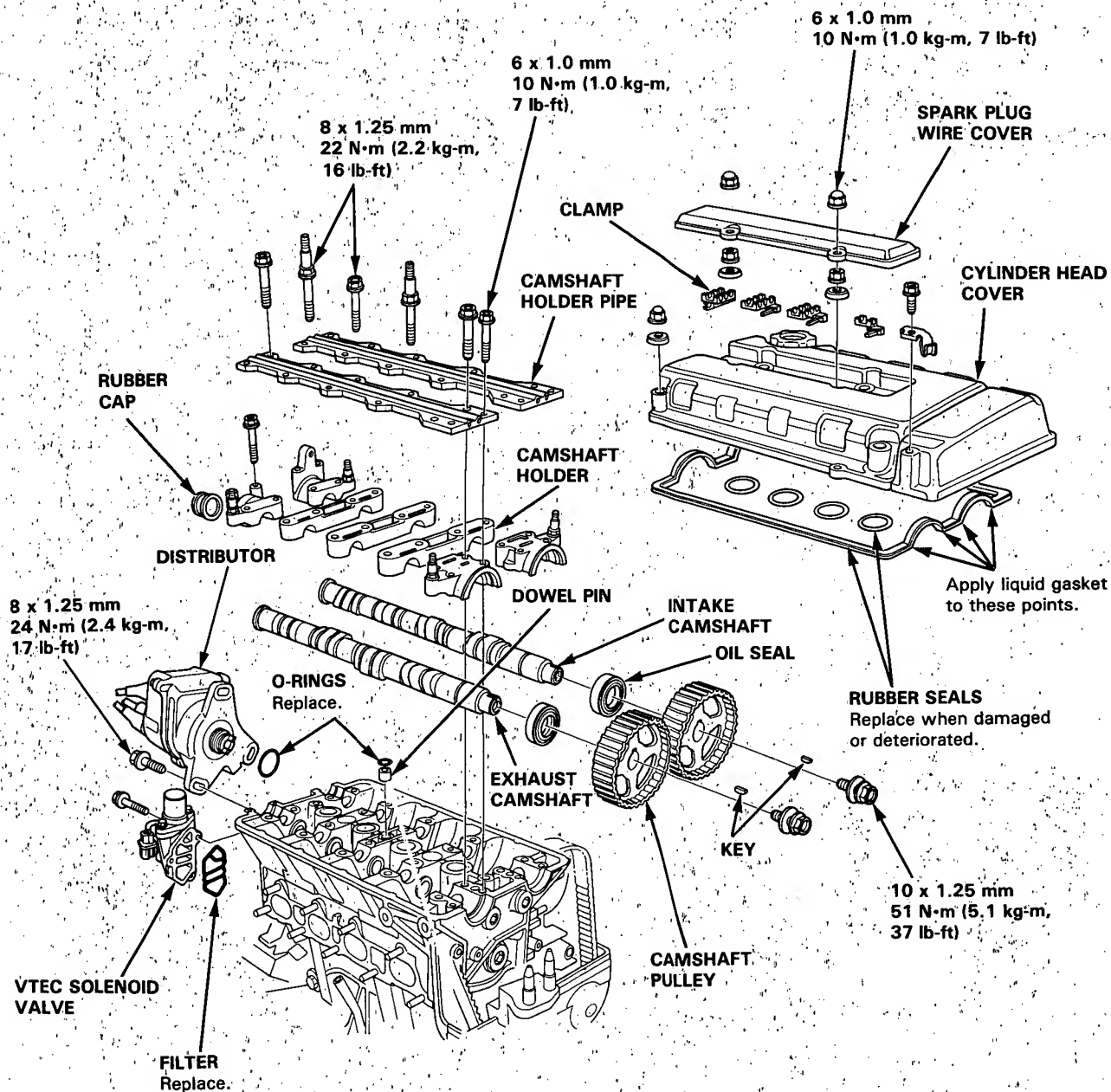
**CAUTION:** To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 100°F (38°C) before removing it.

## NOTE:

- Use new O-rings and gaskets when reassembling.
- Use liquid gasket, Part No. 08718-0001.

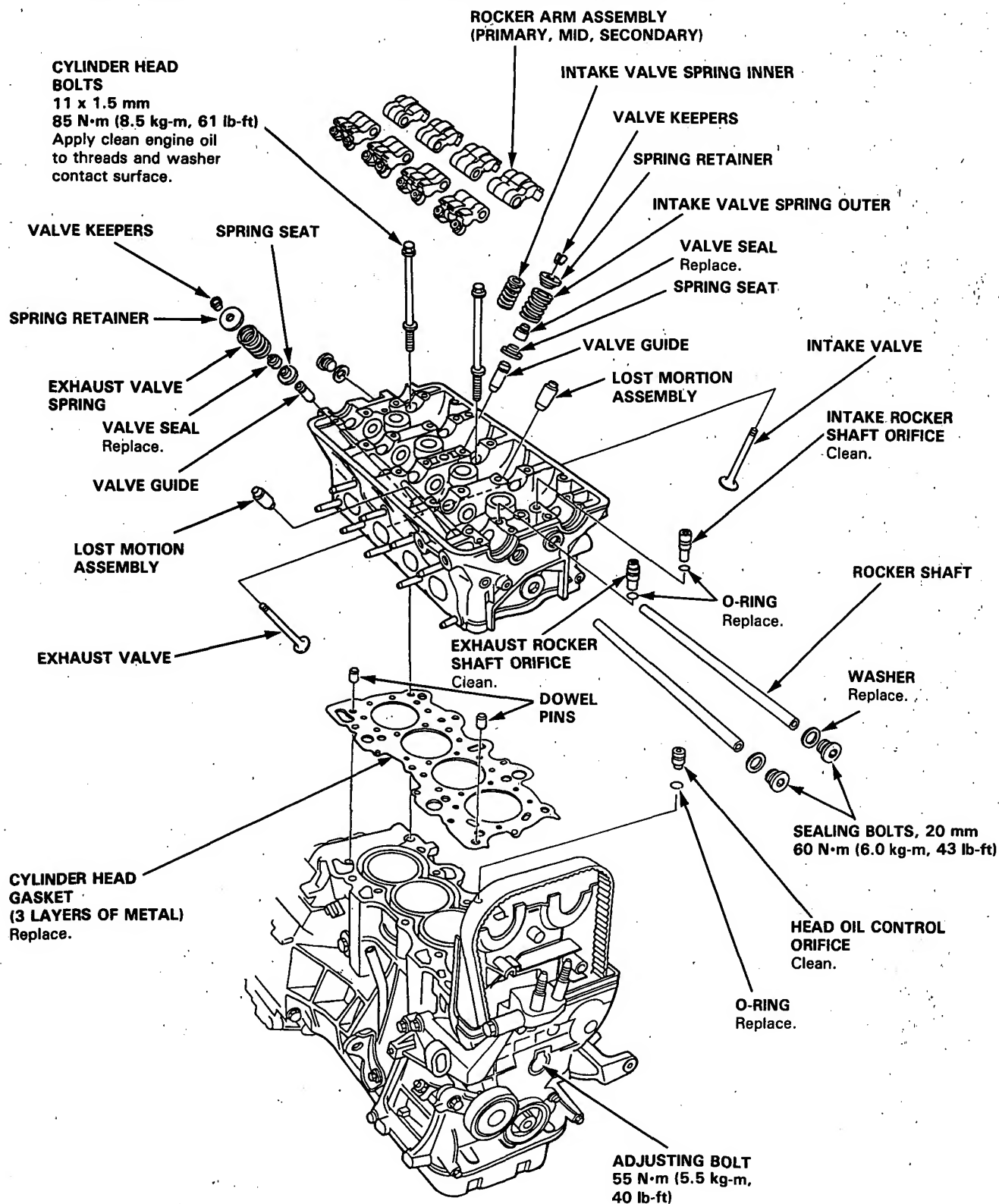


Prior to reassembling, clean all the parts in solvent, dry them, and apply lubricant to any contact parts.





NOTE: Clean the head oil control orifice and the rocker shaft orifices when installing.



# Cylinder Head

## Removal

Engine removal is not required for this procedure.

**CAUTION:** To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 100°F (38°C) before loosening the retaining bolts.

### NOTE:

- Inspect the timing belt before removing the cylinder head.
- Turn the crankshaft pulley so that the No. 1 piston is at top dead center (TDC) (page 6-68).
- Mark all emissions hoses before disconnecting them.
- Anti-theft radios have a coded theft protection circuit. Be sure to get the customer's code number before.
  - Disconnecting the battery.
  - Removing the No. 14 (15A) fuse.
  - Removing the radio.

After service, reconnect power to the radio and turn it on.

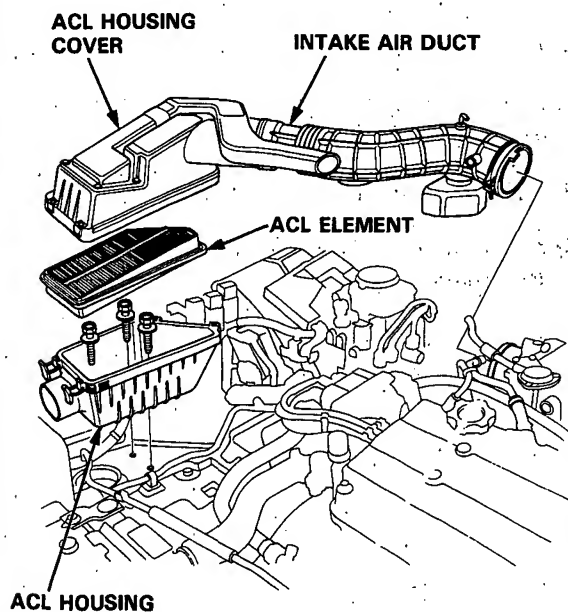
When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

1. Disconnect the negative terminal from the battery.
2. Drain the engine coolant (see section 10).
  - Remove the radiator cap to speed draining.

3. Relieve fuel pressure.

**⚠ WARNING** Do not smoke while working on fuel system, keep open flame or spark away from work area. Drain fuel only into an approved container.

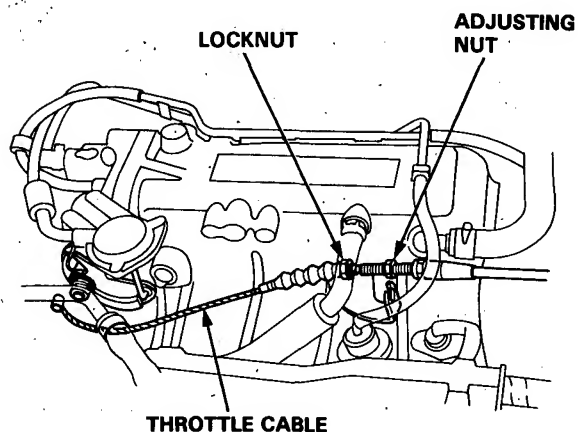
4. Remove the intake air duct and air cleaner (ACL) housing assembly.



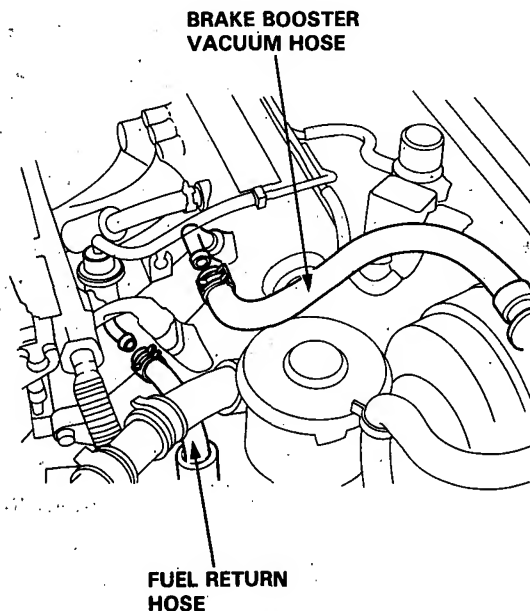
5. Remove the fuel feed hose and evaporative emission (EVAP) control canister hose from the intake manifold.
6. Remove the throttle cable at the throttle body.
7. Remove the throttle control cable from the throttle body automatic transmission (A/T) only.

### NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the throttle cable when installing (see section 11).



8. Remove the fuel return hose and brake booster vacuum hose.





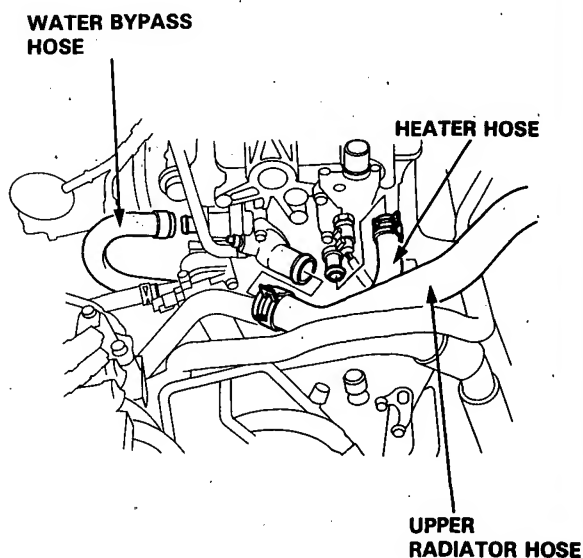
9. Remove the engine wire harness connectors and wire harness clamps from the cylinder head and the intake manifold.

- Four fuel injector connectors
- Intake air temperature (IAT) sensor connector
- Idle air control (IAC) valve connector
- Throttle position sensor connector
- Ground cable terminal
- Engine coolant temperature (ECT) sensor connector
- ECT switch connector
- ECT sending unit connector
- VTEC solenoid valve connector
- VTEC pressure switch connector

10. Remove the spark plug wire cover, then remove the spark plug caps and wires (page 6-36).

11. Disconnect two connectors, then remove the distributor.

12. Remove the upper radiator hose, water bypass hose and heater hose.

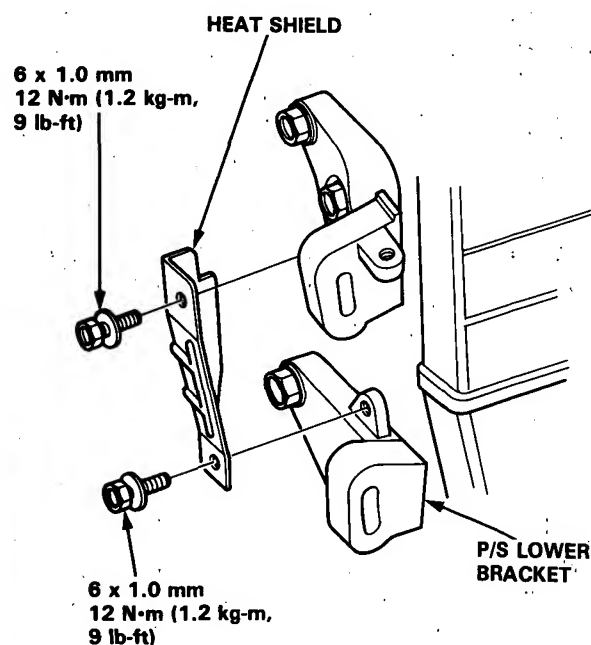


13. Remove the engine ground cable on the cylinder head cover.

14. Remove the power steering (P/S) belt and pump.

- Do not disconnect the P/S hoses.

15. Remove the heat shield.



16. Remove the intake manifold bracket.

17. Remove the self-locking nuts and disconnect the exhaust manifold and exhaust pipe A.

18. Remove the exhaust manifold bracket.

19. Remove positive crankcase ventilation (PCV) hose, then remove the cylinder head cover.

20. Remove the middle cover.

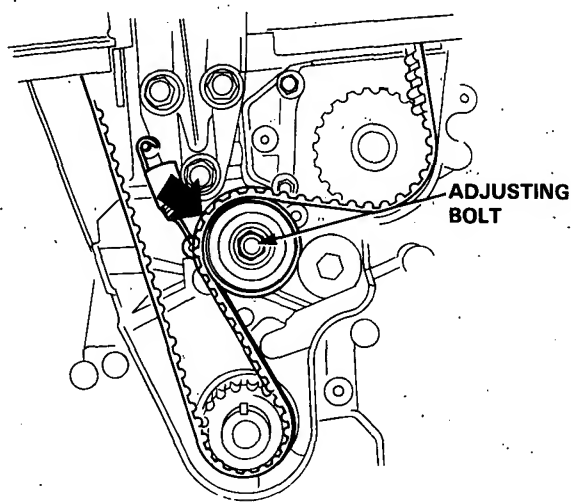
(cont'd)

# Cylinder Head

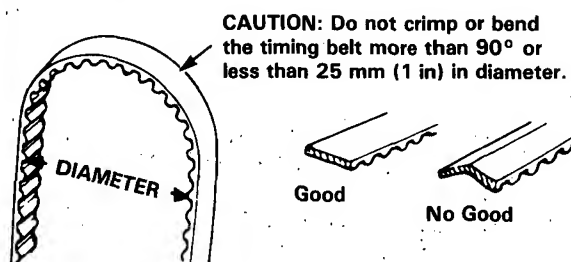
## Removal (cont'd)

21. Loosen the timing belt adjusting bolt 180°.

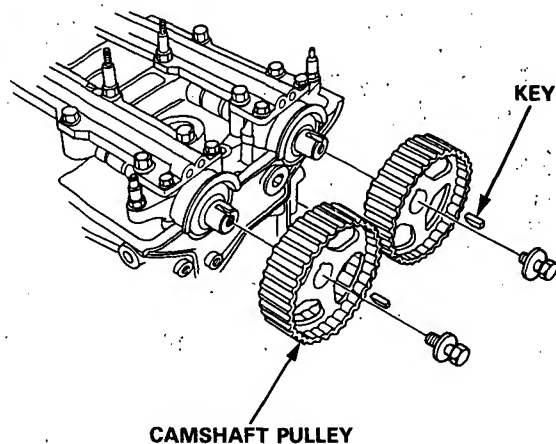
22. Push the tensioner to release tension from the timing belt, then retighten the adjusting bolt.



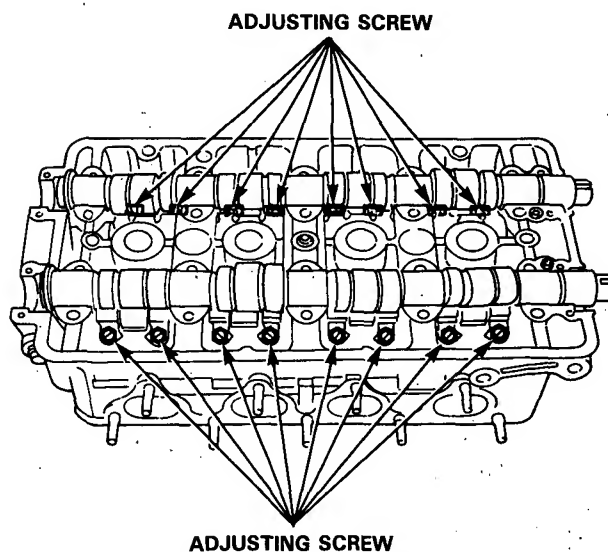
23. Remove the belt from the camshaft pulleys.



24. Remove the camshaft pulleys.



25. Loosen the adjusting screws, then remove the camshaft holders and camshafts.

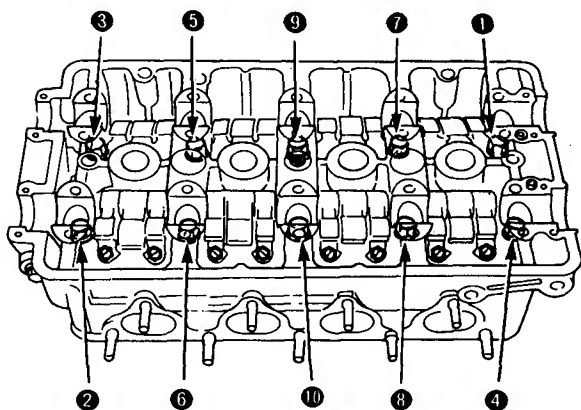




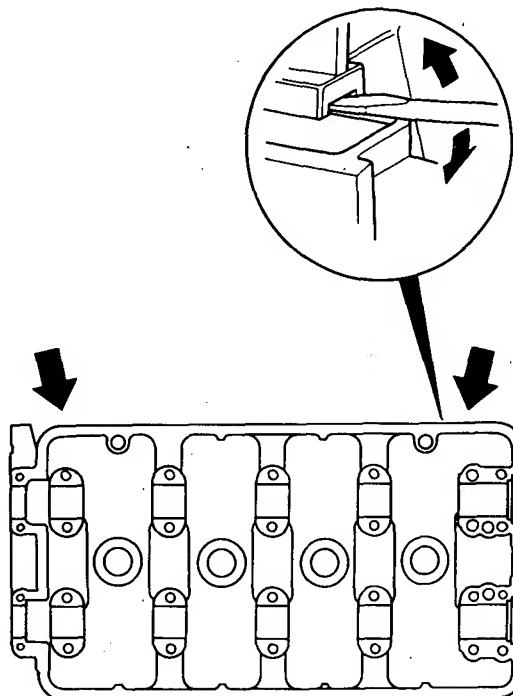
26. Remove the cylinder head bolts, then remove the cylinder head.

**CAUTION:** To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat until all bolts are loosened.

**CYLINDER HEAD BOLT LOOSENING SEQUENCE**



**NOTE:** Separate the cylinder head from the block with a flat blade screwdriver as shown.

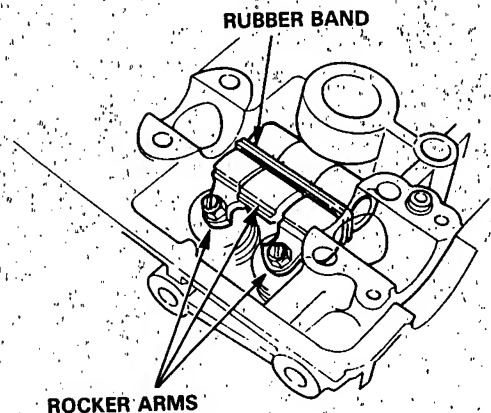


27. Remove the intake manifold and exhaust manifold from the cylinder head.

# Rocker Arms

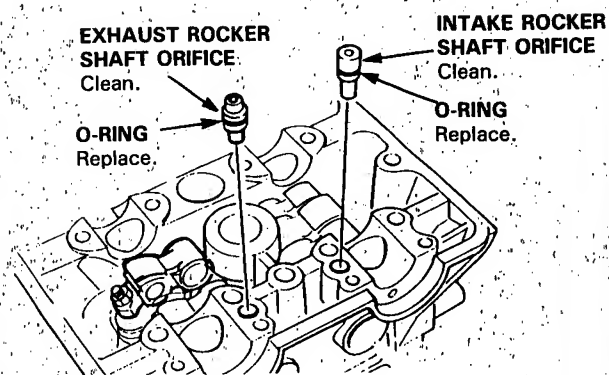
## Removal

1. Hold the rocker arms together with a rubber band to prevent them from separating.

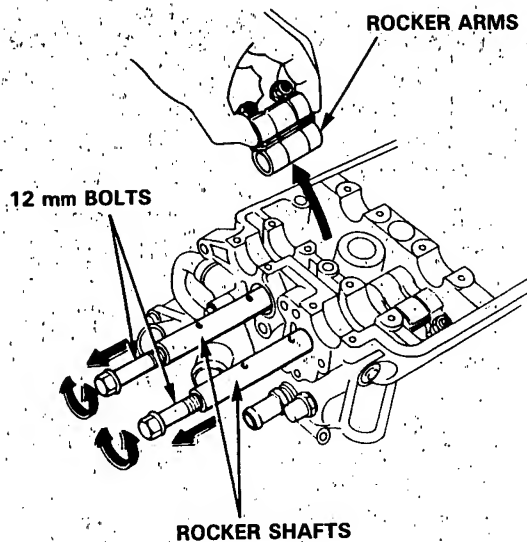


2. Remove the intake and exhaust rocker shaft orifice, then remove the VTEC solenoid valve and the sealing bolts.

**NOTE:** The shapes of the rocker shaft orifices of the intake and exhaust are different. Identify the parts as they are removed to ensure reinstallation in the original locations.



3. Screw 12 mm bolts into the rocker arm shafts. Remove each rocker arm set while slowly pulling out intake and exhaust rocker arm shafts.








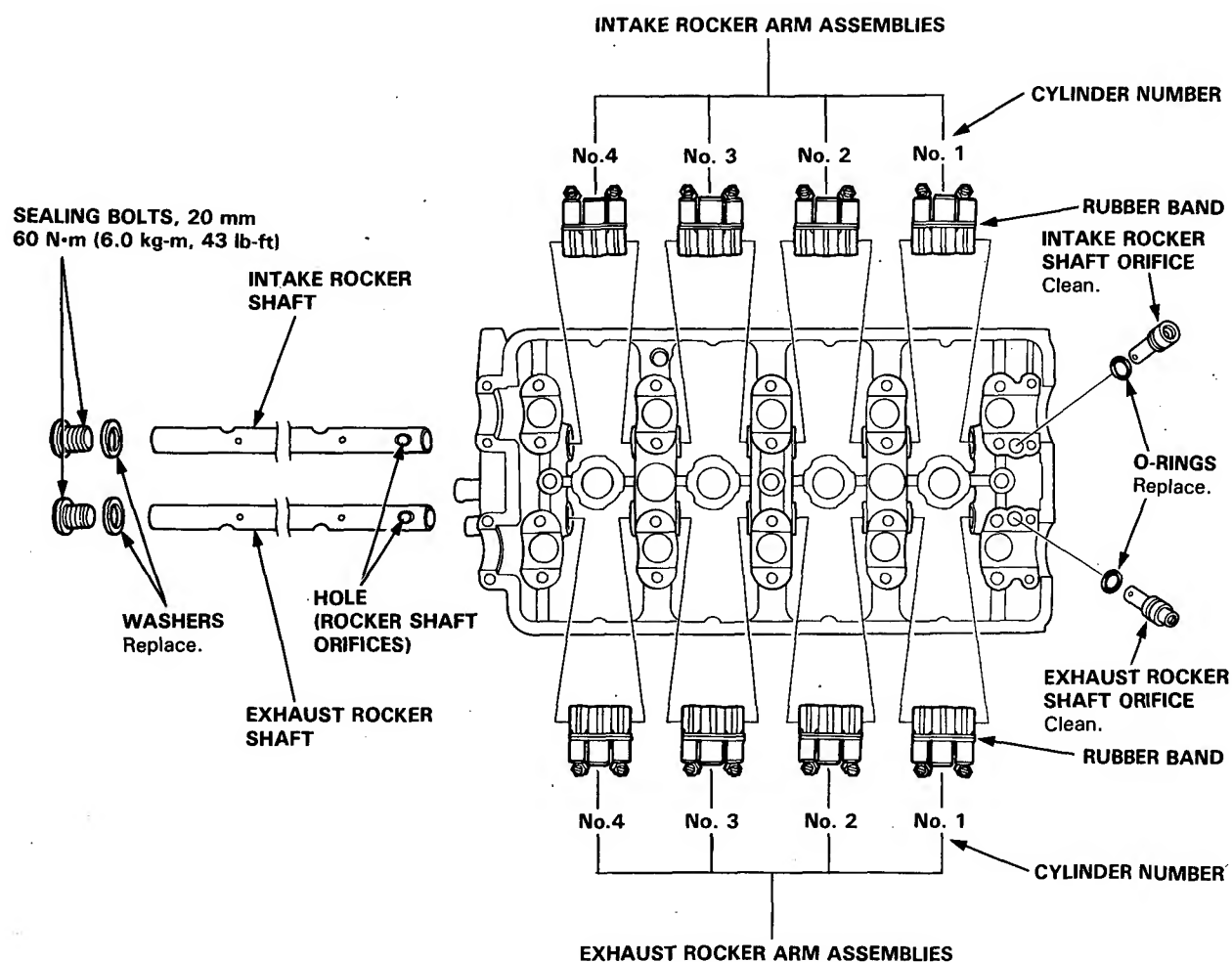
## Locations

**CAUTION:** After installing the rocker shaft orifice, try to turn the rocker shaft to make sure that the orifice is correctly inserted in the hole of rocker shaft. If the orifice is in place, it should not turn.

### NOTE:

- Identify parts as they are removed to ensure reinstallation in original locations.
- Inspect rocker shafts and rocker arms (pages 6-48 and 49).
- Rocker arms must be installed in the same position if reused.
- Clean the rocker shaft orifices when installing.

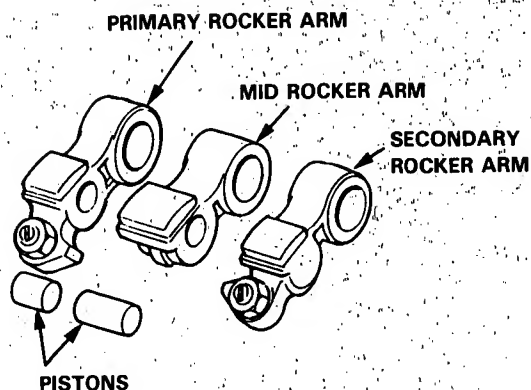
 Prior to reinstalling, clean all the parts in solvent, dry them and apply lubricant to any contact surfaces.



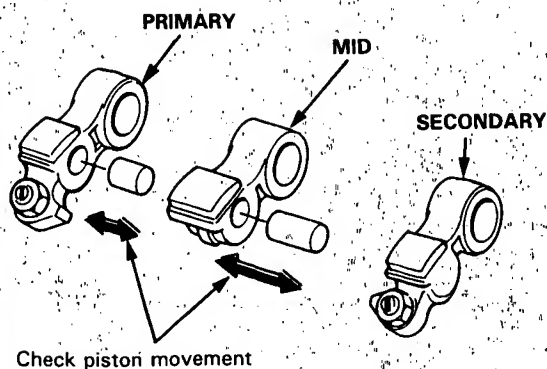
# Rocker Arms

## Inspection

**NOTE:** When reassembling the primary rocker arm, carefully apply air pressure to the oil passage of the rocker arm.



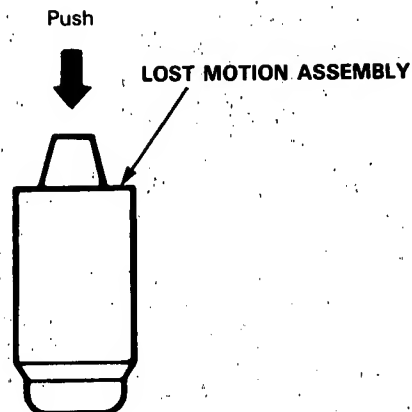
1. Inspect the rocker arm piston. Push it manually.
  - If it does not move smoothly, replace the rocker arm assembly.



**NOTE:**

- Apply oil to the pistons when reassembling.
- Bundle the rocker arms with a rubber band to keep them together as a set.

2. Remove the lost motion assembly from the cylinder head and inspect it. Test it by pushing the plunger with your finger.
  - If the lost motion assembly does not move smoothly, replace it.

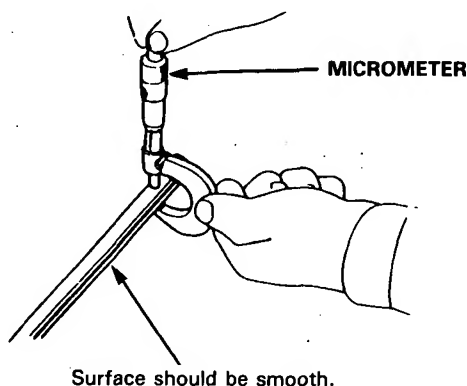




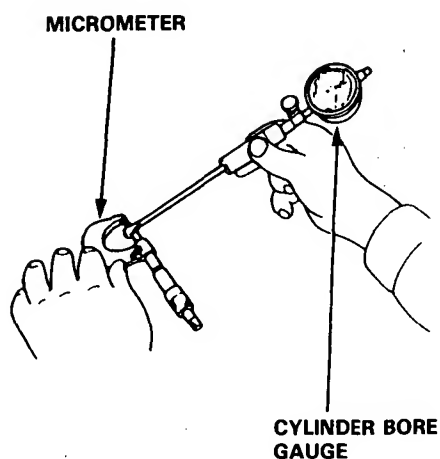
## Arm-to-Shaft Clearance

Measure both the intake rocker shaft and exhaust rocker shaft.

1. Measure diameter of shaft at first rocker location.



2. Zero gauge to shaft diameter:



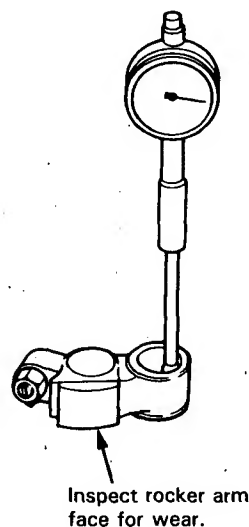
3. Measure inside diameter of rocker arm and check for out-of-round condition.

### Rocker Arm-to-Shaft Clearance:

#### Intake and Exhaust

Standard (New): 0.025–0.052 mm  
(0.0010–0.0020 in)

Service Limit: 0.08 mm (0.003 in)



Repeat for all rockers.

— If over limit, replace rocker shaft and all over-tolerance rocker arms.

NOTE: If any rocker arm needs replacement, replace all three rocker arms in that set (primary, mid, and secondary).

# Rocker Arms

## Installation

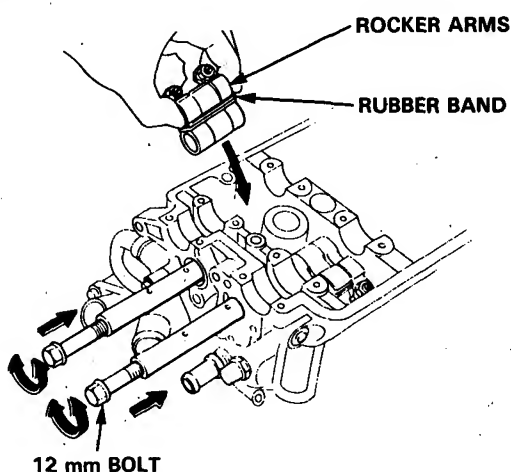
1. Install the rocker arms in the reverse order of removal:

- Valve adjusting locknuts should be loosened and adjusting screw backed off before installation.
- The component parts must be reinstalled in the original locations:

2. Install the lost motion assemblies.

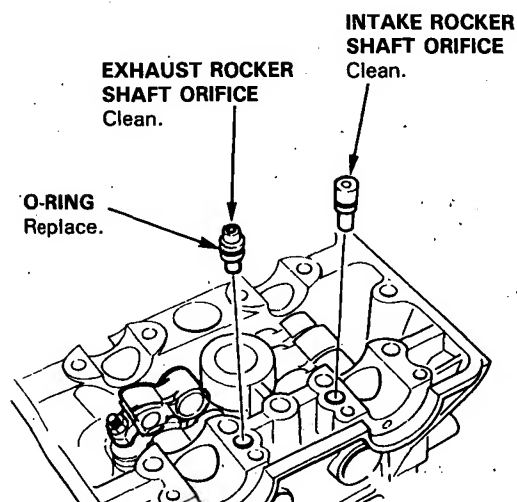
3. Install the rocker arms while inserting the rocker arm shaft into the cylinder head.

NOTE: Remove the rubber band after installing the rocker arms.



4. Clean and install the rocker shaft orifices with new O-rings. If the holes in the rocker arm shaft and cylinder head are not in line with each other, mount a 12 mm bolt on the rocker arm shaft and rotate the shaft.

NOTE: The shapes of the rocker shaft orifices for the intake and exhaust are different. The orifices must be installed in the original locations.



# Camshafts

## Inspection



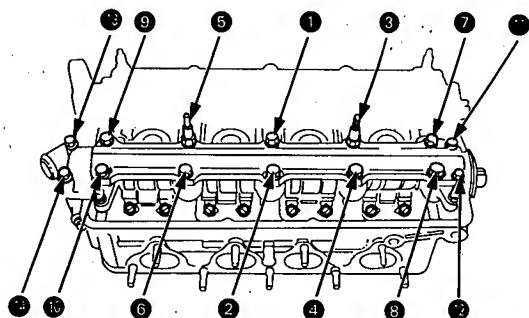
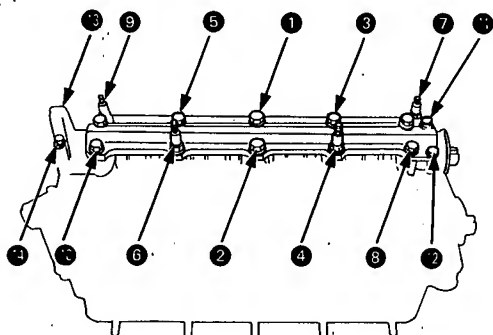
### NOTE:

- Do not rotate the camshaft during inspection.
- Remove the rocker arms and rocker shafts.

1. Put the camshafts and camshaft holders on the cylinder head, and then tighten the bolts to the specified torque.

### Specified Torque:

- ①—⑨: 8 mm bolts 22 N·m (2.2 kg-m, 16 lb-ft)
- ⑩—⑫: 6 mm bolts 11 N·m (1.1 kg-m, 8 lb-ft)

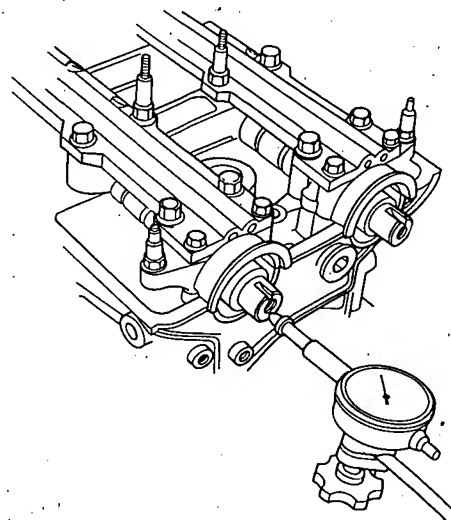


2. Seat each camshaft by pushing it toward distributor end of cylinder head.
3. Zero the dial indicator against end of distributor drive, then push the camshaft back and forth and read the end play.

### Camshaft End Play:

Standard (New): 0.05–0.15 mm  
(0.002–0.006 in)

Service Limit: 0.5 mm (0.02 in)



4. Remove the bolts, then remove the camshaft holders from the cylinder head.

— Lift camshaft out of cylinder head, wipe clean, then inspect lift ramps. Replace camshaft if lobes are pitted, scored, or excessively worn.

— Clean the camshaft bearing surfaces in the cylinder head, then set camshaft back in place.

— Place a plastigage strip across each journal.

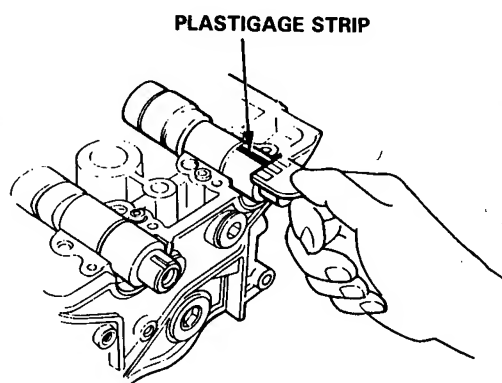
5. Put the camshaft on the cylinder head, then install the camshaft holders, and then tighten the bolts to the specified torque, as shown in the left column on this page.

6. Measure widest portion of plastigage strip on each journal.

### Camshaft-to-Holder Oil Clearance:

Standard (New): 0.050–0.089 mm  
(0.002–0.004 in)

Service Limit: 0.15 mm (0.006 in)



(cont'd)

# Camshafts

## Inspection (cont'd)

7. If camshaft-to-holder oil clearance is out of tolerance:

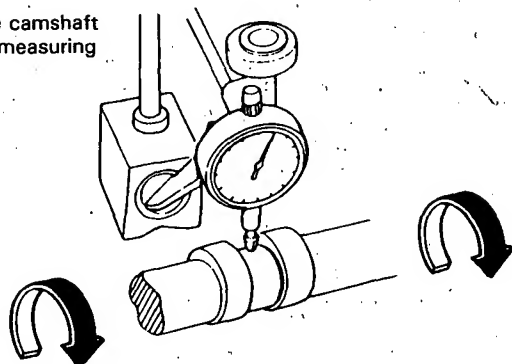
- And camshaft has already been replaced, you must replace the cylinder head.
- If camshaft has not been replaced, first check total runout with the camshaft supported on V-blocks.

### Camshaft Total Runout:

Standard (New): 0.03 mm (0.001 in)

Service Limit: 0.06 mm (0.002 in)

Rotate camshaft while measuring

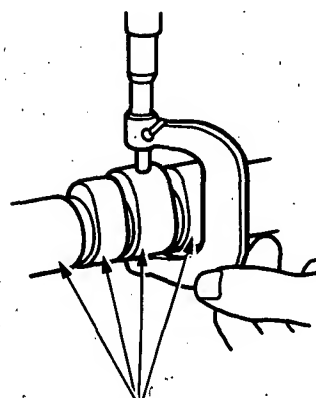


- If the total runout of the camshaft is within tolerance, replace the cylinder head.
- If the total runout is out of tolerance, replace the camshaft and recheck. If the bearing clearance is still out of tolerance, replace the cylinder head.

8. Check cam lobe wear.

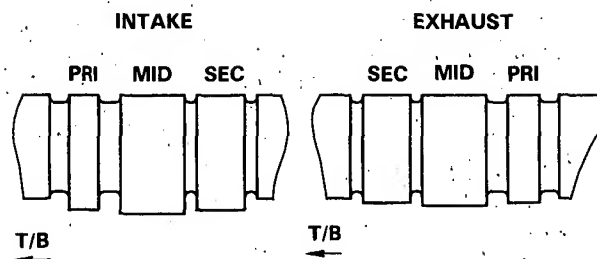
### Cam Lobe Height Standard (New):

	INTAKE	EXHAUST
PRIMARY	33.088 mm (1.3027 in)	32.785 mm (1.2907 in)
MID	36.431 mm (1.4343 in)	35.720 mm (1.4063 in)
SECONDARY	34.978 mm (1.3771 in)	34.691 mm (1.3658 in)



Check this area for wear.

### Cam Position



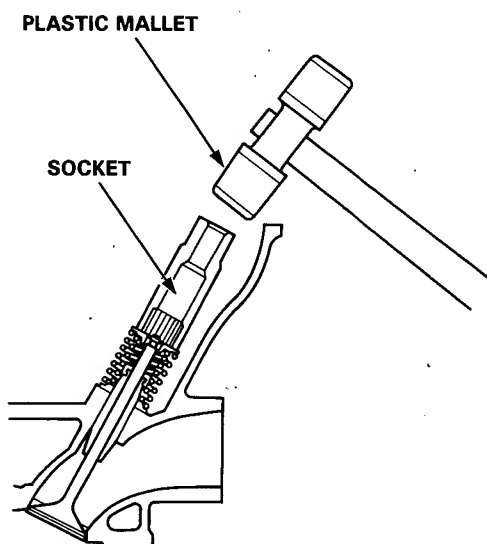
T/B: TIMING BELT  
PRI: PRIMARY  
MID: MID  
SEC: SECONDARY

# Valves, Valve Springs and Valve Seals

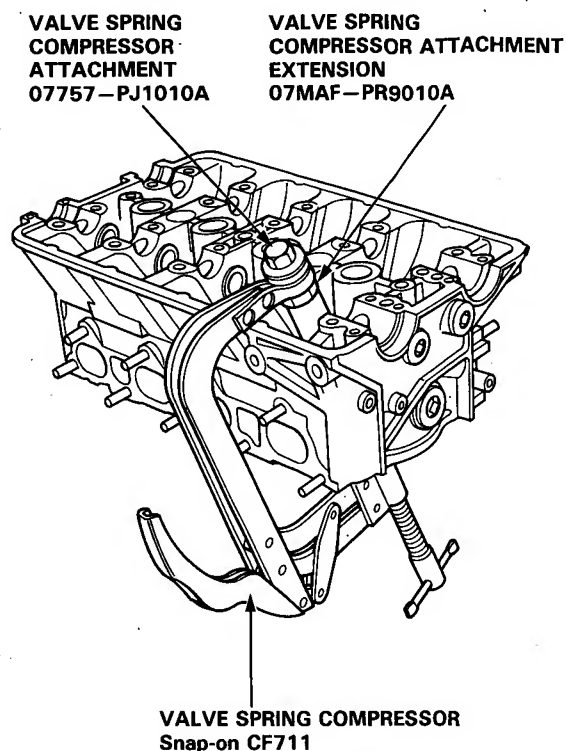


## Removal

NOTE: Identify valves and valve springs as they are removed so that each item can be reinstalled in its original position.



2. Install spring compressor. Compress spring and remove valve keeper.

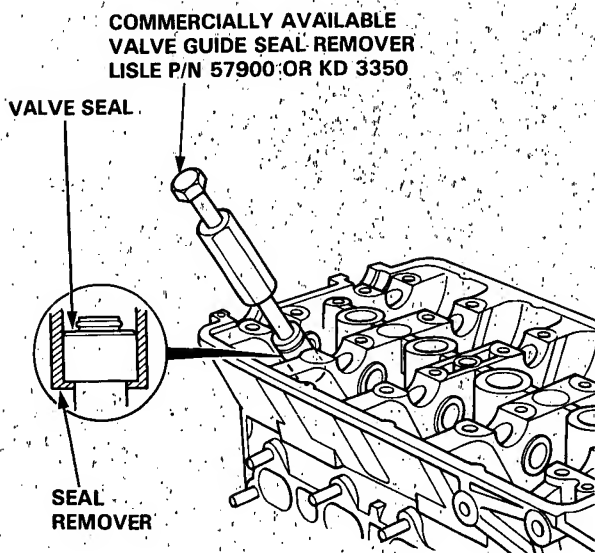


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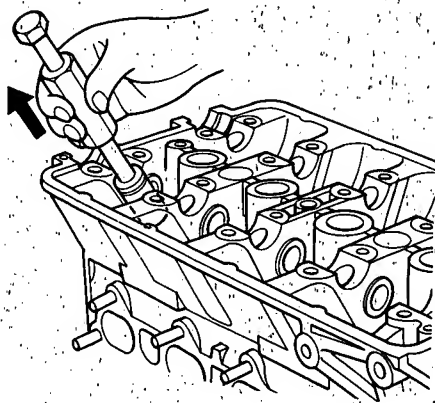
# Valves, Valve Springs and Valve Seals

## Removal (cont'd)

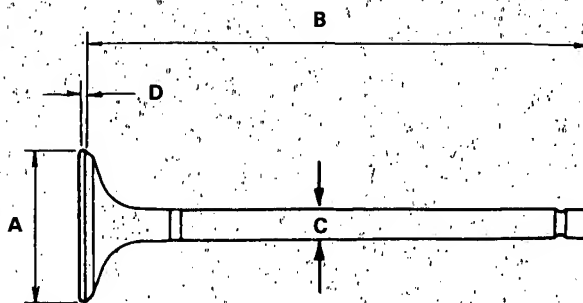
3. Install the special tool as shown.



4. Remove the valve guide seal.



## Valve Dimensions



### Intake Valve

- A Standard (New): 32.90–33.10 mm  
(1.295–1.303 in)  
B Standard (New): 101.00–101.30 mm  
(3.976–3.988 in)  
C Standard (New): 5.475–5.485 mm  
(0.2156–0.2159 in)  
C Service Limit: 5.445 (0.2144 in)  
D Standard (New): 1.05–1.35 mm  
(0.041–0.053 in)  
D Service Limit: 0.85 mm (0.033 in)

### Exhaust Valve

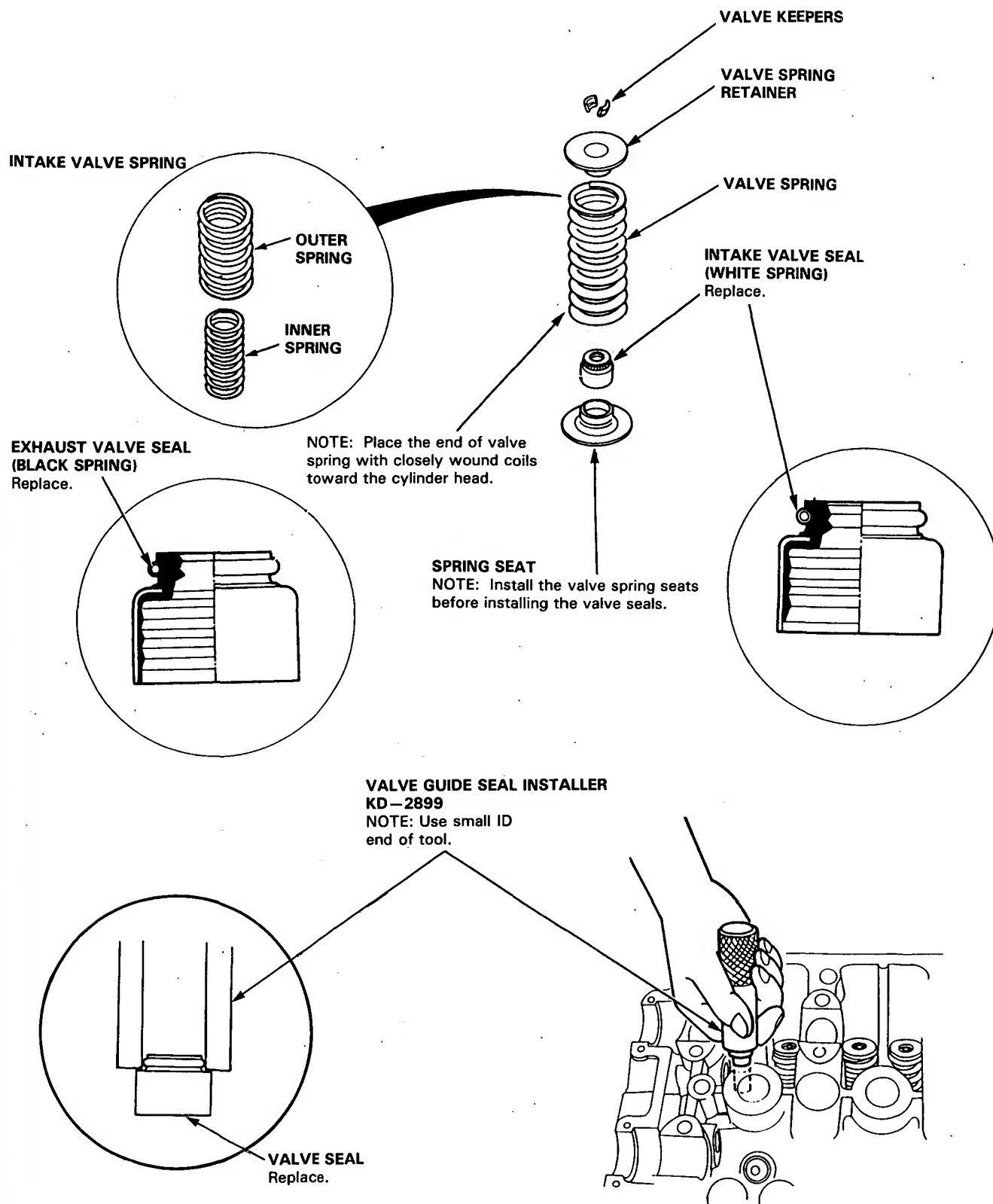
- A Standard (New): 27.90–28.10 mm  
(1.098–1.106 in)  
B Standard (New): 100.60–100.90 mm  
(3.961–3.972 in)  
C Standard (New): 5.450–5.460 mm  
(0.2146–0.2150 in)  
C Service Limit: 5.420 (0.2134 in)  
D Standard (New): 1.65–1.95 mm  
(0.065–0.077 in)  
D Service Limit: 1.45 mm (0.057 in)





## Valve Spring and Valve Seal Installation Sequence

NOTE: Exhaust and intake valve seals are NOT interchangeable.

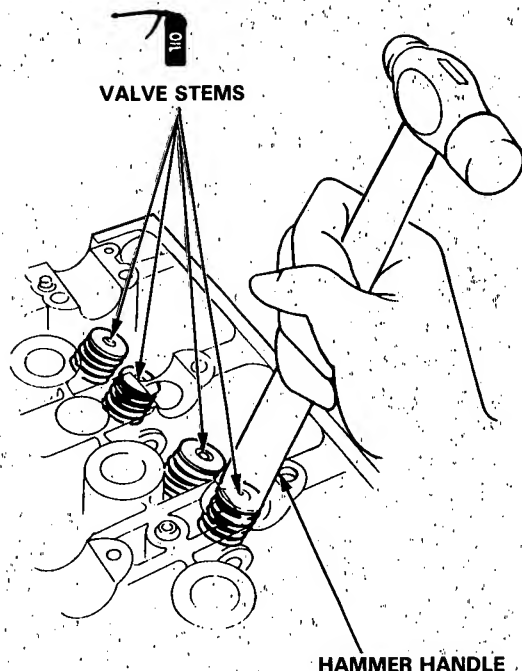


# Valves, Valve Springs and Valve Seals

## Valve Installation

- When installing valves in cylinder head, coat valve stems with oil before inserting into valve guides, and make sure valves move up and down smoothly.
- When valves and springs are in place, lightly tap the end of each valve stem two or three times to ensure proper seating of valve and valve keepers (use hammer handle).

NOTE: Tap the valve stem only along its axis so you do not bend the stem.



## Valve Guides

### Valve Movement

Measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).

#### Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.05—0.11 mm  
(0.002—0.004 in)

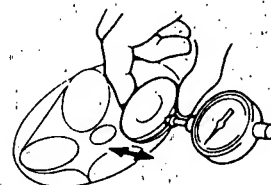
Service Limit: 0.16 mm (0.006 in)

#### Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.10—0.16 mm  
(0.004—0.006 in)

Service Limit: 0.22 (0.009 in)

Valve extended 10 mm out from seat.



- If measurement exceeds the service limit, recheck using a new valve.
- If measurement is now within the service limit, reassemble using a new valve.
- If measurement still exceeds limit, recheck using alternate method below, then replace valve and guide, if necessary.

NOTE: An alternate method of checking guide to stem clearance is to subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge.

Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

#### Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.025—0.055 mm  
(0.0010—0.0022 in)

Service Limit: 0.08 mm (0.003 in)

#### Exhaust Valve Stem-to-Guide Clearance:

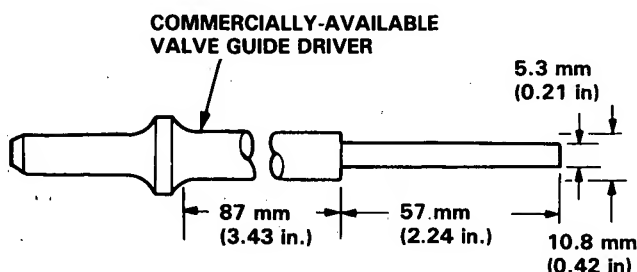
Standard (New): 0.050—0.080 mm  
(0.0020—0.0031 in)

Service Limit: 0.11 mm (0.004 in)



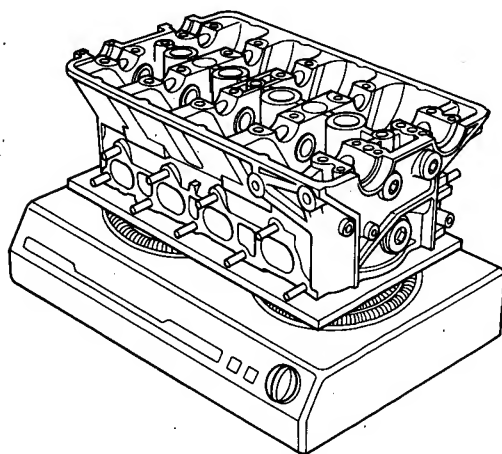
## Replacement

1. As illustrated in the removal steps of this procedure, use a commercially—available air-impact driver attachment modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the Valve Guide Driver and a conventional hammer.



Removal and Installation  
VALVE GUIDE DRIVER  
5.5 mm  
07742-0010100

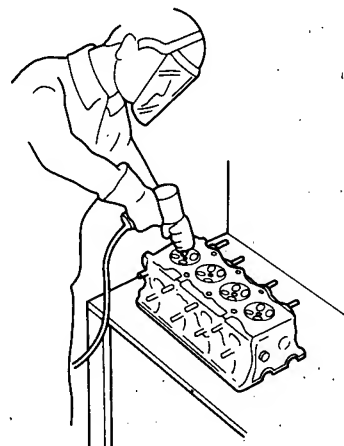
2. Select the proper replacement guides and chill them in the freezer section of a refrigerator for about an hour.
3. Use a hot plate or oven to evenly heat the cylinder head to 300°F (150°C). Monitor the temperature with a cooking thermometer.



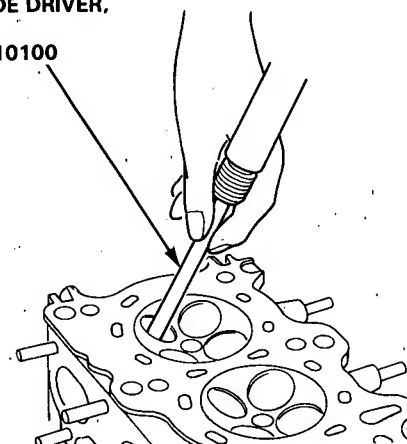
### CAUTION:

- Do not use a torch; it may warp the head.
- Do not get the head hotter than 300°F (150°C); excessive heat may loosen the valve seats.
- To avoid burns, use heavy gloves when handling the heated cylinder head.

4. Working from the camshaft side, use the driver and an air hammer to drive the guide about 2 mm towards the combustion chamber. This will knock off some of the carbon and make removal easier.



VALVE GUIDE DRIVER,  
5.5 mm  
07742-0010100



### CAUTION:

- Always wear safety goggles or a face shield when using the air hammer.
- Hold the air hammer directly in line with the valve guide to prevent damaging the driver.

5. Turn the head over and drive the guide out toward the camshaft side of head.

If a valve guide still won't move, drill it out with a 8.0 mm (5/16 in) bit, then try again.

**CAUTION:** Drill guides only in extreme cases: you could damage the cylinder head if the guide breaks.

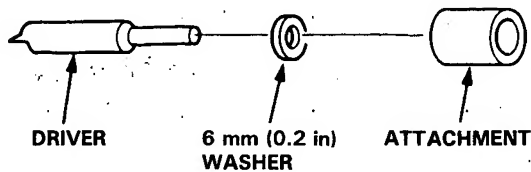
6. Remove the new guide(s) from the refrigerator, one at a time, as you need them.

(cont'd)

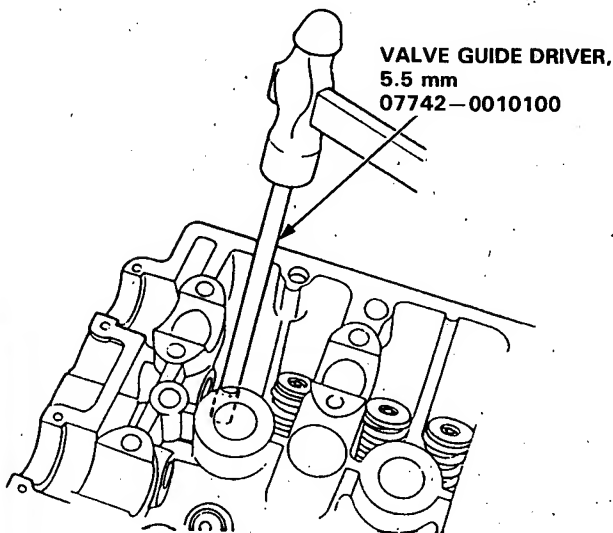
# Valve Guides

## Replacement (cont'd)

7. Slip a 6 mm (0.2 in) steel washer and the correct driver attachment over the end of the driver (The washer will absorb some of the impact and extend the life of the driver).



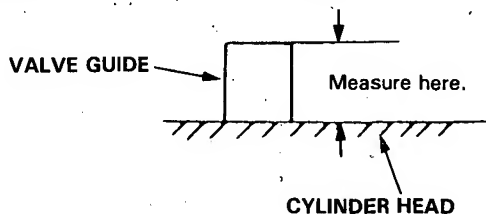
8. Install the new guide(s) from the camshaft side of the head; drive each one in until the attachment bottoms on the head. If you have all sixteen guides to do, you may have to reheat the head one or two more times.



### Valve Guide Installed Height:

Intake: 12.55–13.05 mm (0.494–0.514 in)

Exhaust: 12.55–13.05 mm (0.494–0.514 in)



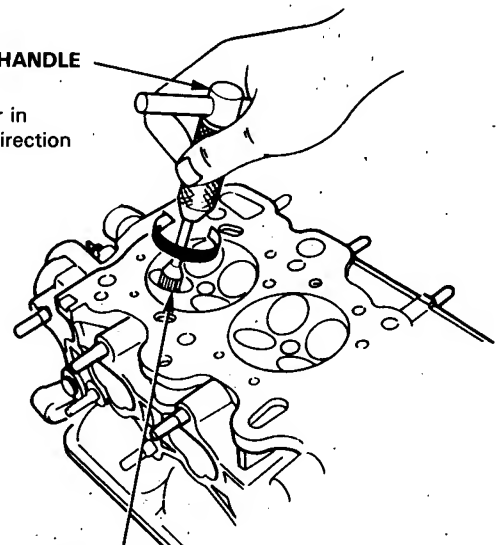
## Reaming

NOTE: For new valve guides only.

1. Coat both reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise the full length of the valve guide bore.
3. Continue to rotate the reamer clockwise while removing it from the bore.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check clearance with a valve (page 6-56).
  - Verify that the valve slides in the intake and exhaust valve guides without exerting pressure.

### REAMER HANDLE

Turn reamer in  
clockwise direction  
only.



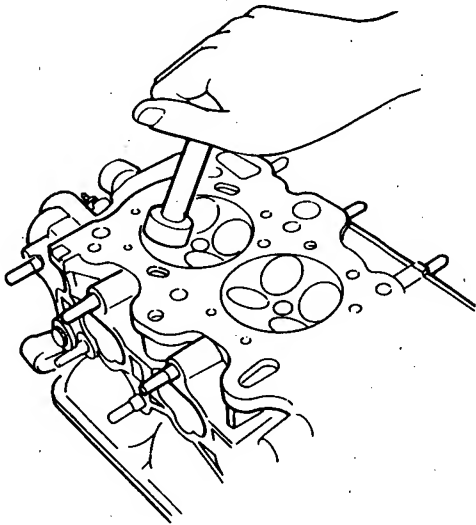
# Valve Seats



## Reconditioning

1. Renew the valve seats in the cylinder head using valve seat cutters.

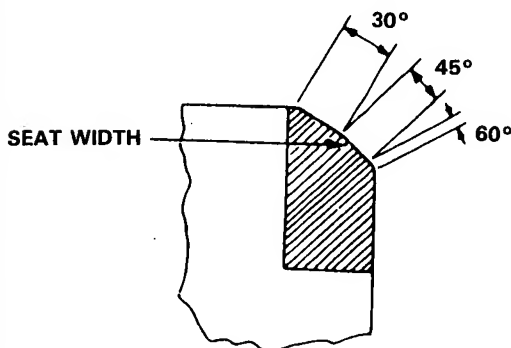
NOTE: If guides are worn, replace them before cutting the valve seats.



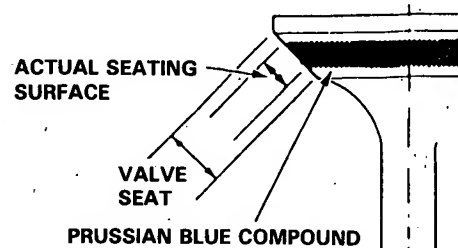
2. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
3. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 60° cutter. Check width of seat and adjust accordingly.
4. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutters.

### Valve Seat Width:

Standard: 1.25–1.55 mm (0.049–0.061 in)  
Service Limit: 2.0 mm (0.08 in)



5. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue Compound to the valve face, and insert valve in original location in the head, then lift it and snap it closed against the seat several times.



6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
  - If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
  - If it is too low (closer to the valve edge), you must make a second cut with the 30° cutter to move it up, then one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

7. Insert intake and exhaust valves in the head and measure valve stem installed height.

### Intake Valve Stem Installed Height:

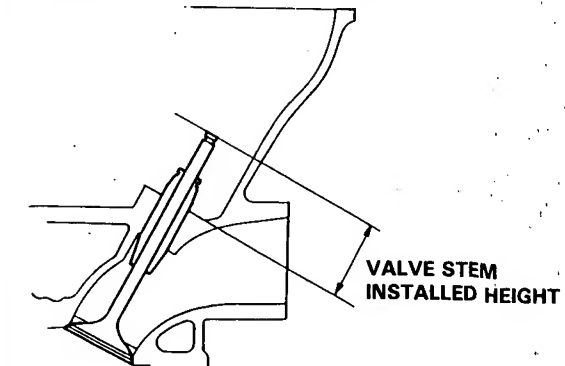
Standard (New): 37.465–37.935 mm  
(1.4750–1.4935 in)

Service Limit: 38.185 mm (1.5033 in)

### Exhaust Valve Stem Installed Height:

Standard (New): 37.165–37.635 mm  
(1.4632–1.4817 in)

Service Limit: 37.885 (1.4915 in)



8. If valve stem installed height is over the service limit, replace valve and recheck. If still over the service limit, replace cylinder head; the valve seat in the head is too deep.

# Cylinder Head

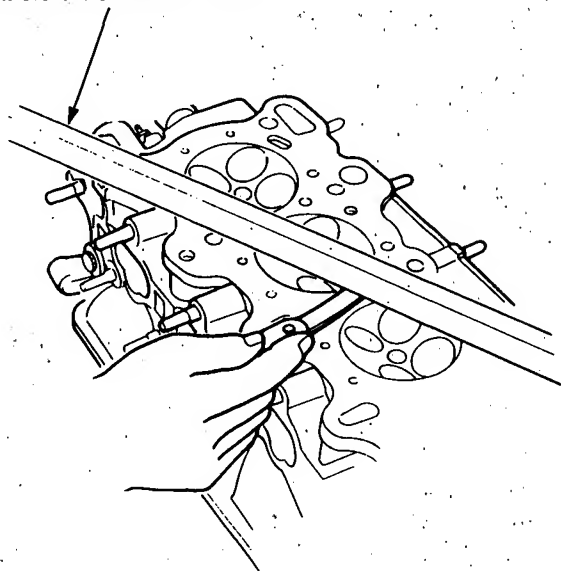
## Warpage

**NOTE:** If camshaft-to-holder oil clearances (page 6-51) are not within specification, the head cannot be resurfaced.

If camshaft-to-holder oil clearances are within specifications, check the head for warpage.

- If warpage is less than 0.05 mm (0.002 in) cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.002 in) and 0.2 mm (0.008 in), resurface cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 142 mm (5.59 in).

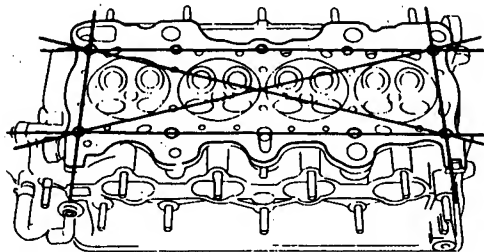
PRECISION STRAIGHT EDGE



**Cylinder Head Height:**

**Standard (New):** 141.95–142.05 mm  
(5.589–5.593 in)

Measure along edges, and 3 ways across center.

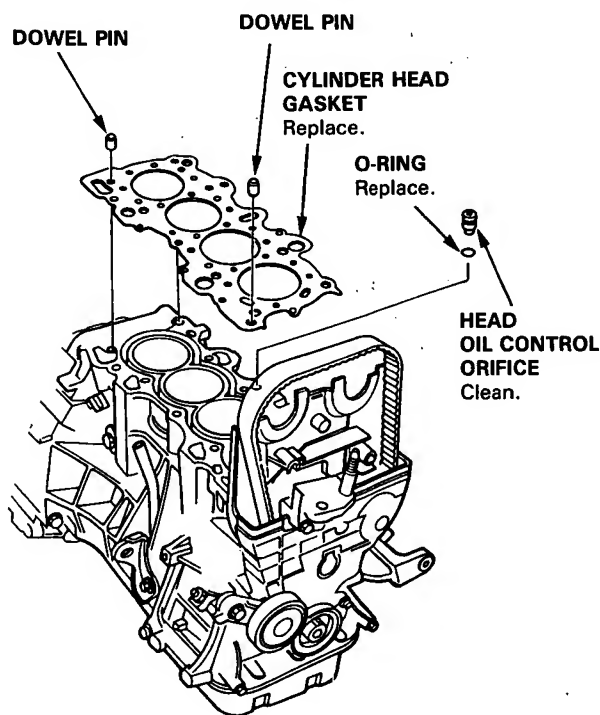




## Installation

1. Install the cylinder head in the reverse order of removal:
  - Always use a new head and manifold gasket.
  - The cylinder head gasket is a metal gasket. Take care not to bend it.
  - Rotate the crankshaft, set the No. 1 piston at TDC (page 6-68).
2. Install the cylinder head gasket, dowel pins and the head oil control orifice on the cylinder head.

NOTE: Clean the head oil control orifice when installing it to the cylinder head.

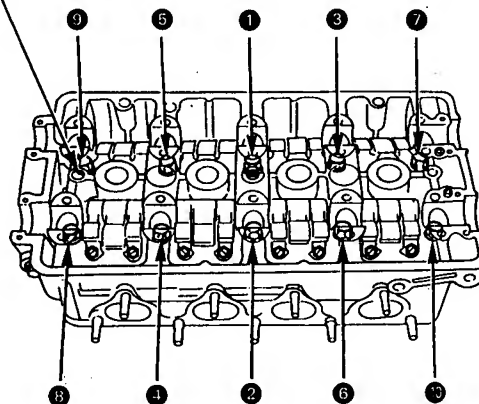


3. Tighten cylinder head bolts in two steps. In the first step, tighten all bolts in sequence to about 30 N·m (3.0 kg-m, 22 lb-ft). In the final step, tighten in same sequence to 85 N·m (8.5 kg-m, 61 lb-ft).

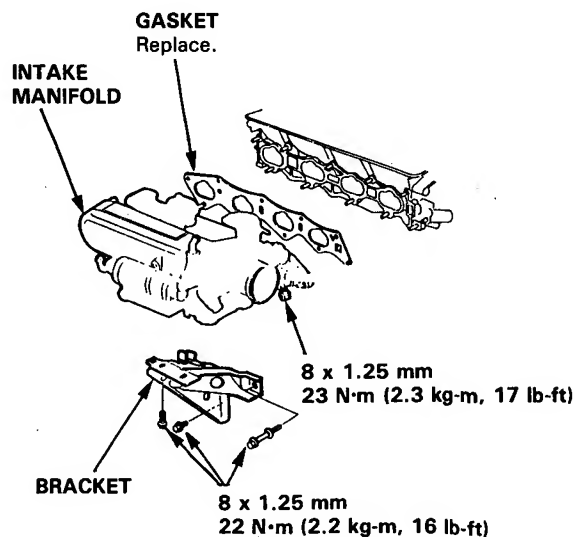
NOTE: Apply clean engine oil to the bolt threads and under the bolt head.

### CYLINDER HEAD BOLT TORQUE SEQUENCE

11 x 1.5 mm  
85 N·m (8.5 kg-m, 61 lb-ft)



4. Install the intake manifold and tighten the nuts in a criss-cross pattern in two or three steps, beginning with the inner nuts.



(cont'd)

# Cylinder Head

## Installation (cont'd)

5. Install the exhaust manifold and tighten the new self-locking nuts in a criss-cross pattern in two or three steps, beginning with the inner nuts.

- Use new self-locking nuts.

### SELF LOCKING NUT

8 x 1.0 mm

32 N·m (3.2 kg-m, 23 lb-ft)

Replace.

### GASKET

Replace.

### UPPER COVER

### LOWER SHROUD

### EXHAUST MANIFOLD BRACKET

8 x 1.25 mm  
24 N·m (2.4 kg-m,  
17 lb-ft)

10 x 1.25 mm  
45 N·m (4.5 kg-m,  
33 lb-ft)

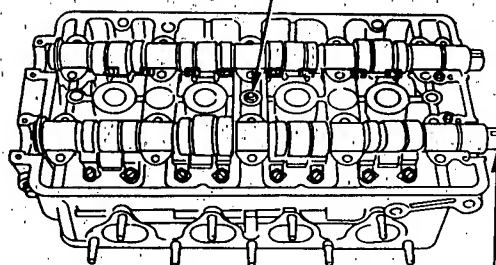
10 x 1.25 mm  
34 N·m (3.4 kg-m,  
25 lb-ft)

6. Install the camshafts and camshaft oil seals.

### NOTE:

- Install the camshafts with keyway facing up.
- Install the oil seal with the spring side face in.
- The oil seal housing surface should be dry.
- Set the O-ring and dowel pin in the oil passage of the No. 3 camshaft holder.

O-RING (Replace)  
and DOWEL PIN

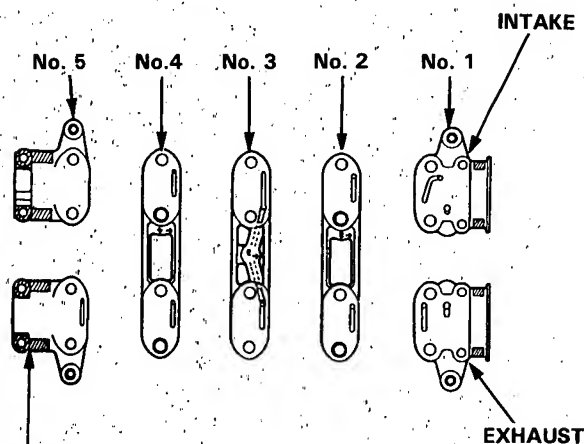


Keyway is facing up.

7. Apply liquid gasket to the head mating surface of the No. 1 and No. 5 camshaft holders on both the intake and exhaust side. Confirm that the camshaft keyways face up, then place those holders, together with the No. 2, No. 3 and No. 4 camshaft holders, on the cylinder head.

NOTE: The arrows marked on the camshaft holders should point to the timing belt.

### CAMSHAFT HOLDERS

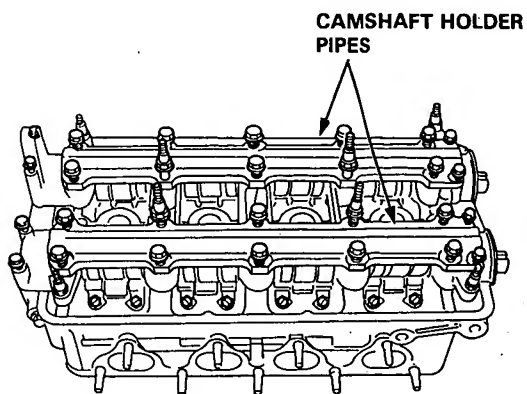


Apply liquid gasket  
to the shaded areas.

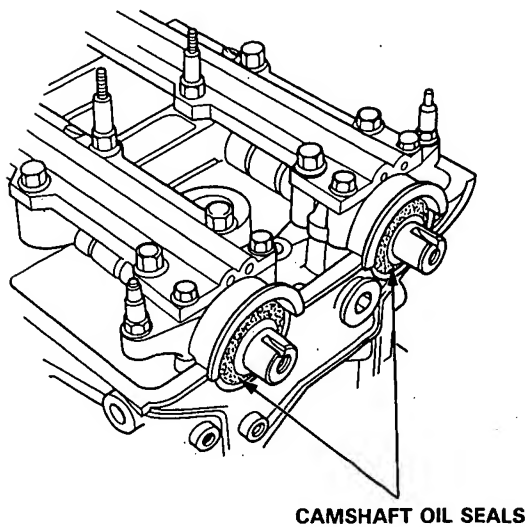




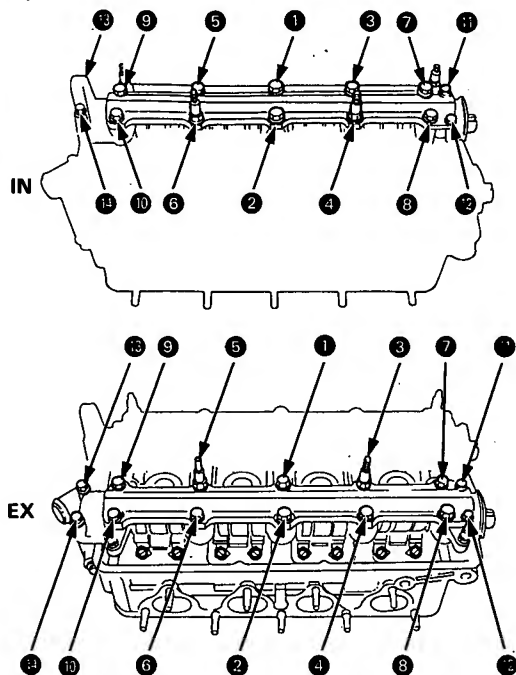
3. Temporarily tighten the bolts of the camshaft holders and the camshaft holder pipes.



4. Push the camshaft oil seal securely against the base of the camshaft holder.



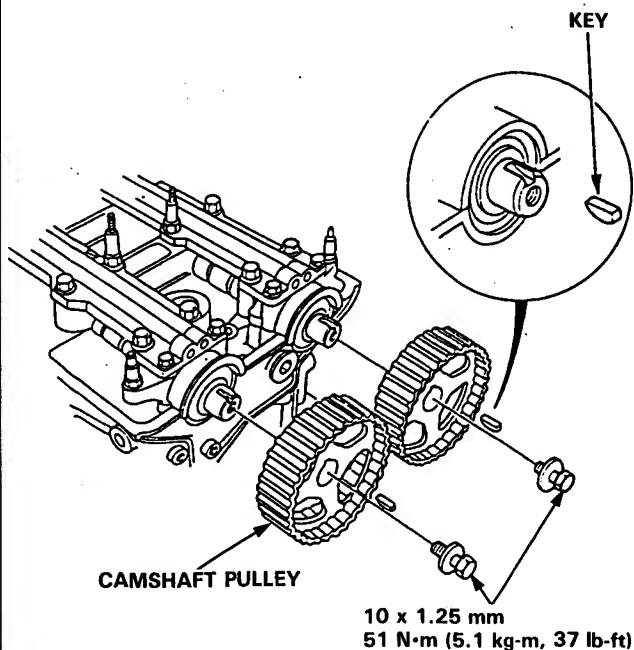
5. Tighten the bolts in the sequence shown below.



- ①—⑨: 8 x 1.25 mm 22 N·m (2.2 kg-m, 16 lb-ft)  
 ⑩—⑫: 6 x 1.0 mm 11 N·m (1.1 kg-m, 8 lb-ft)

6. Install the timing belt back cover.

7. Install the camshaft pulleys.

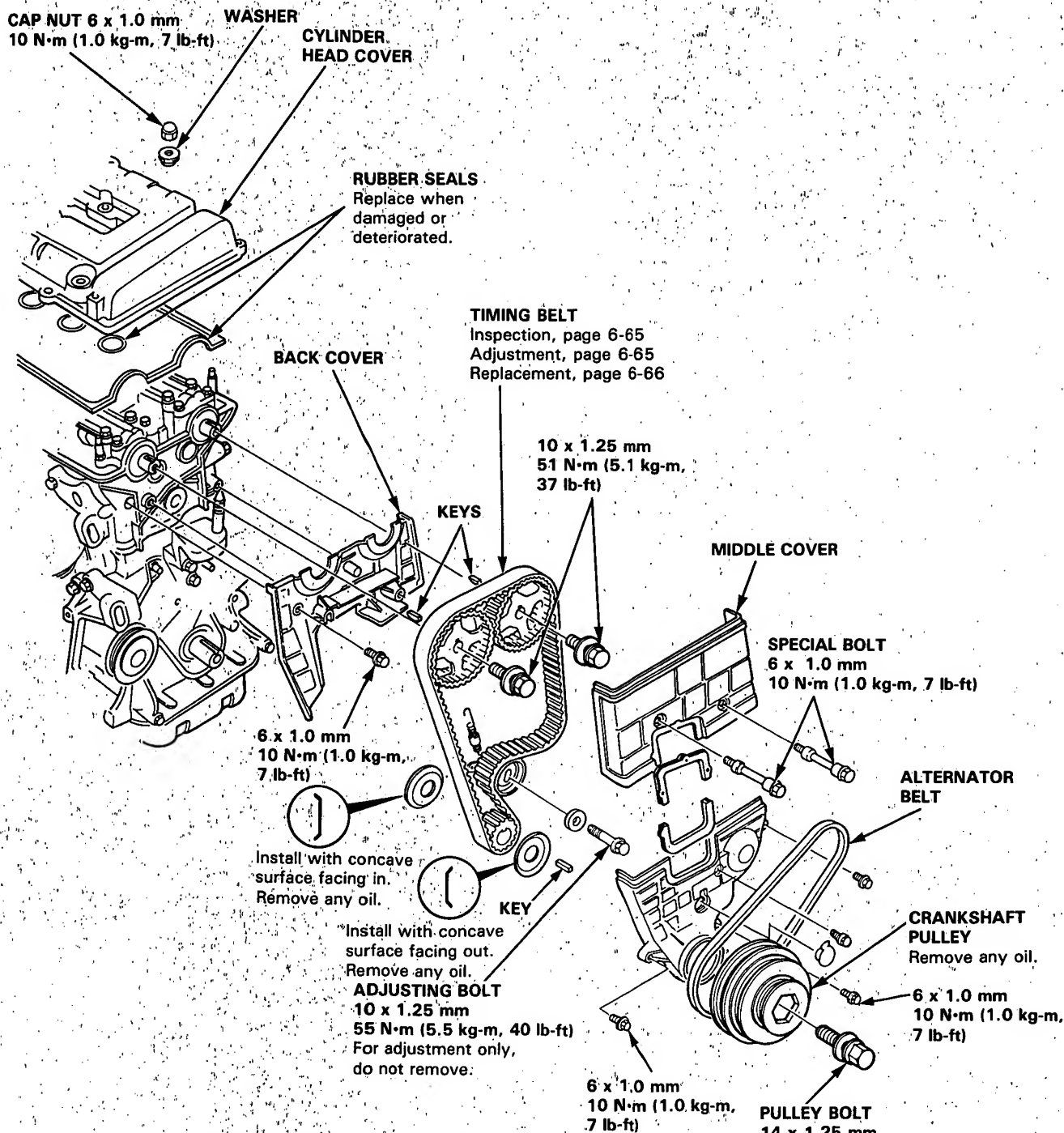


# Timing Belt

## Illustrated Index

### NOTE:

- Refer to section 23 for alternator belt adjustment.
- Refer to section 22 for air conditioning (A/C) compressor belt adjustment.
- Refer to section 17 for power steering (P/S) pump belt adjustment.
- Mark direction of rotation before removing.



NOTE: When installing a new crankshaft and/or new bolt:

- ① tighten the crankshaft pulley bolt to 200 N·m (20.0 kg-m, 145 lb-ft),
- ② loosen bolt,
- ③ retighten it to 180 N·m (18.0 kg-m, 130 lb-ft).

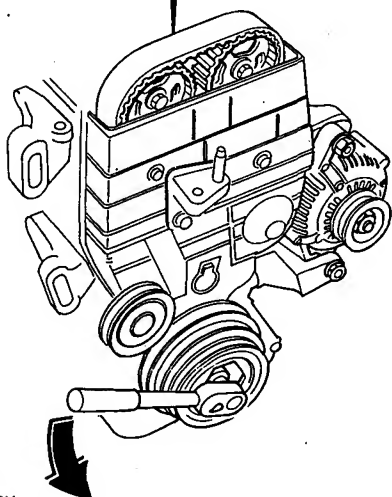
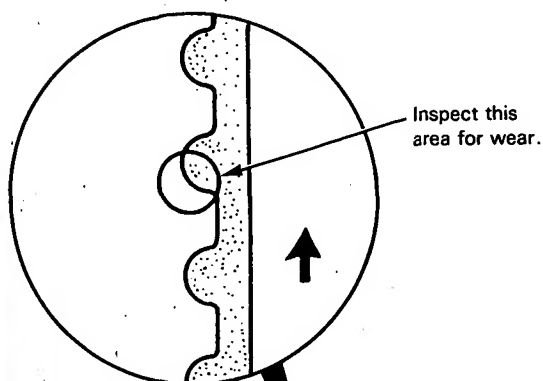


## Inspection

1. Remove the cylinder head cover.
2. Inspect the timing belt for cracks and engine coolant or oil soaking.

### NOTE:

- Replace the belt if oil soaked.
- Remove any oil or solvent that gets on the belt.



4. After inspecting, retorque the crankshaft pulley bolt to 180 N·m (18.0 kg-m, 130 lb-ft).

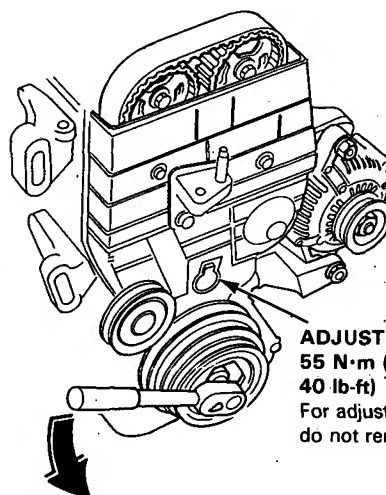
## Tension Adjustment

**CAUTION:** Always adjust timing belt tension with the engine cold.

### NOTE:

- The tensioner is spring-loaded to apply proper tension to the belt automatically after making the following adjustment.
- Always rotate the crankshaft counterclockwise when viewed from the pulley side. Rotating it clockwise may result in improper adjustment of the belt tension.

1. Remove the cylinder head cover.
2. Set the No. 1 piston at TDC (page 6-68).



Direction of rotation.

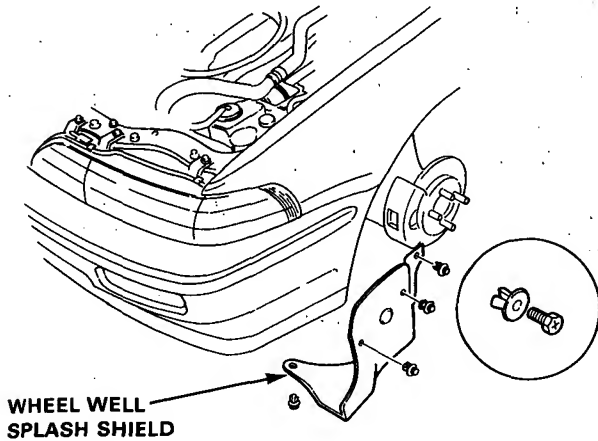
3. Rotate the crankshaft counterclockwise 3-teeth on the camshaft pulley, then loosen the adjusting bolt to create tension on the timing belt.
4. Tighten the adjusting bolt.
5. After adjusting, retorque the crankshaft pulley bolt to 180 N·m (18.0 kg-m, 130 lb-ft).

# Timing Belt

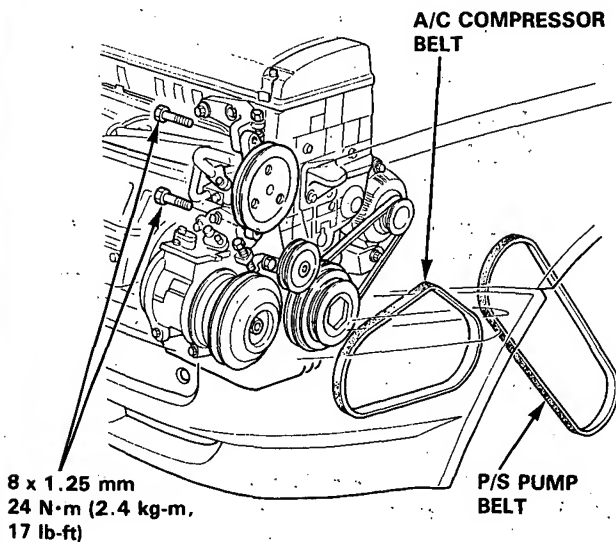
## Removal

**NOTE:** Turn the crankshaft pulley so that the No. 1 piston is at top dead center (TDC) before removing the belt (page 6-68).

1. Remove the wheel well splash shield.



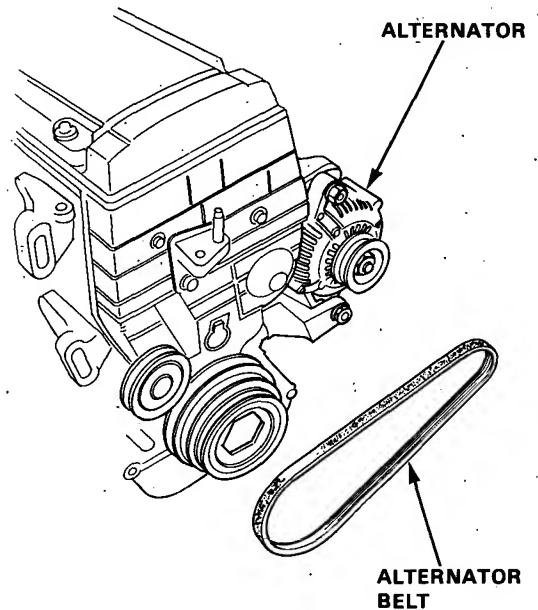
2. Remove the power steering (P/S) pump belt and power steering pump.
  - Do not disconnect the power steering hoses.
3. Remove the air conditioning (A/C) compressor belt (Standard for some types).



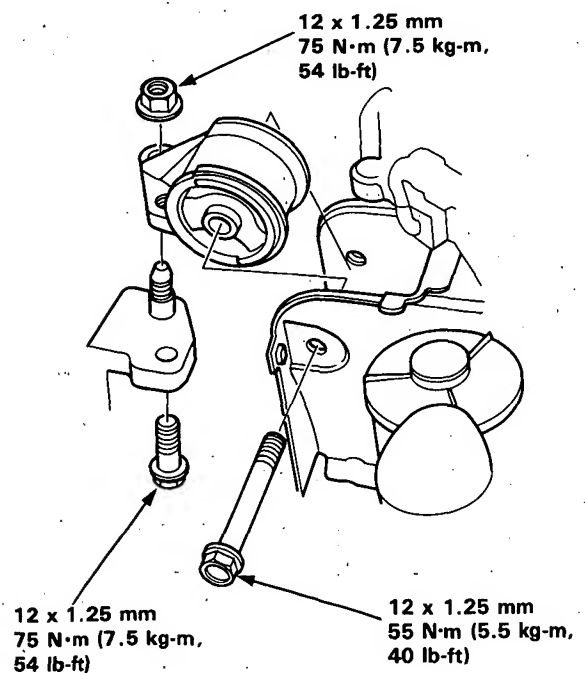
4. Remove the alternator belt.

**NOTE:** After installation, adjust the tension of each belt.

- See section 23 for alternator belt tension adjustment.
- See section 22 for A/C compressor belt tension adjustment.
- See section 17 for power steering pump belt tension adjustment.



5. Remove the side engine support bolts and nut, then remove the side engine mount.





6. Remove the cylinder head cover.

7. Remove the pulley bolt and crankshaft pulley.

8. Remove the middle cover and the lower cover.

9. Loosen the adjusting bolt 180°.

10. Push the tensioner to release tension from the belt, then retighten the adjusting bolt.

11. Remove the timing belt from the pulleys.

CAP NUT 6 x 1.0 mm  
10 N·m (1.0 kg-m, 7 lb-ft)

CYLINDER HEAD  
COVER

WASHER

TIMING BELT  
Adjustment, page 6-65

MIDDLE COVER

6 x 1.0 mm  
10 N·m (1.0 kg-m, 7 lb-ft)

LOWER COVER  
Remove the four  
bolts.

6 x 1.0 mm  
10 N·m  
(1.0 kg-m, 7 lb-ft)

PULLEY BOLT  
14 x 1.25 mm  
180 N·m (18.0 kg-m,  
130 lb-ft)

Apply oil to the bolt  
threads, but not to the  
surface that contacts  
the washer.

CRANKSHAFT  
PULLEY

KEY

BELT  
TENSIONER

ADJUSTING BOLT  
10 x 1.25 mm  
55 N·m (5.5 kg-m,  
40 lb-ft)  
For adjustment only,  
do not remove.

NOTE: When installing a new crankshaft and/or new bolt:  
① tighten the crankshaft pulley bolt to 200 N·m (20 kg-m, 145 lb-ft),  
② loosen bolt,  
③ retighten it to 180 N·m (18.0 kg-m, 130 lb-ft),

# Timing Belt

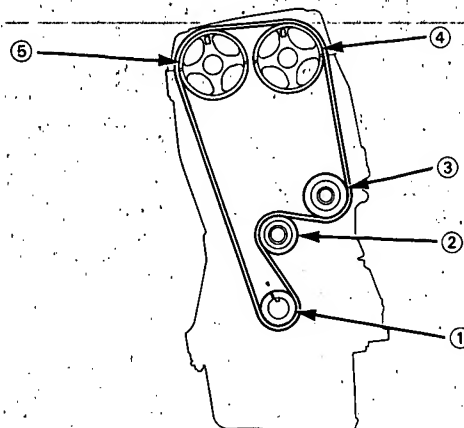
## Installation

1. Install the timing belt in the reverse order of removal;  
Only key points are described here.

2. Position the crankshaft and the camshaft pulleys as shown before installing the timing belt.

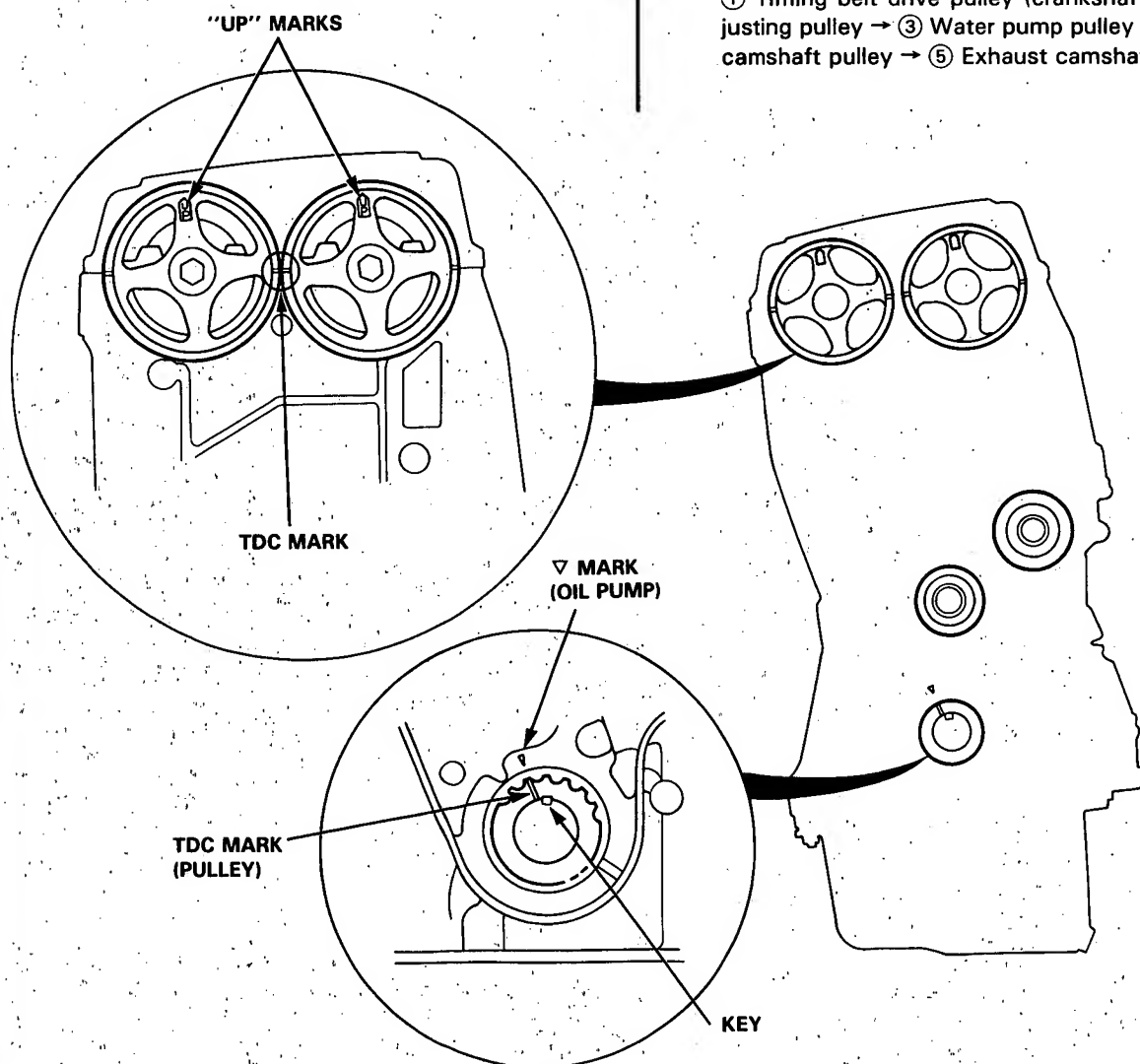
A. Set the crankshaft so that the No. 1 piston is at top dead center (TDC). Align the groove on the teeth side of the timing belt drive pulley to the ▽ pointer on the oil pump.

B. Align the TDC marks on intake and exhaust pulleys.



3. Install the timing belt tightly in the sequence shown.

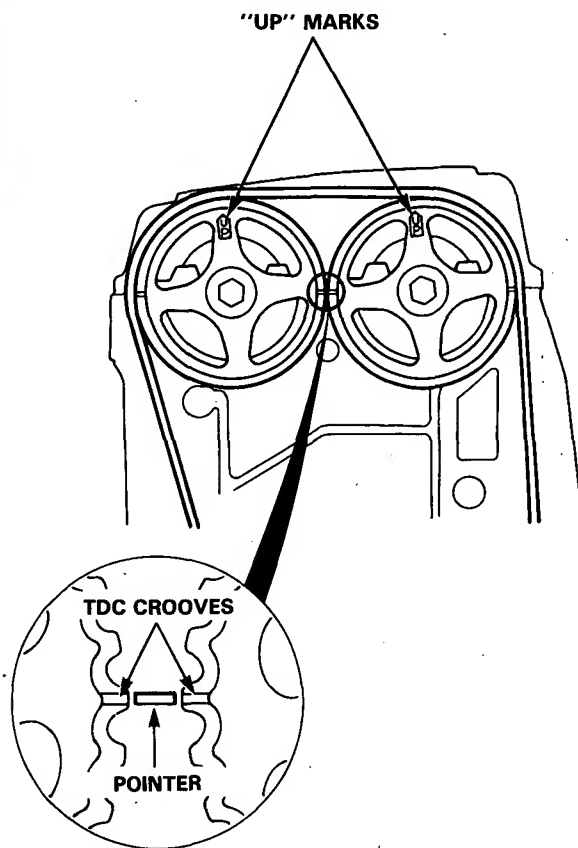
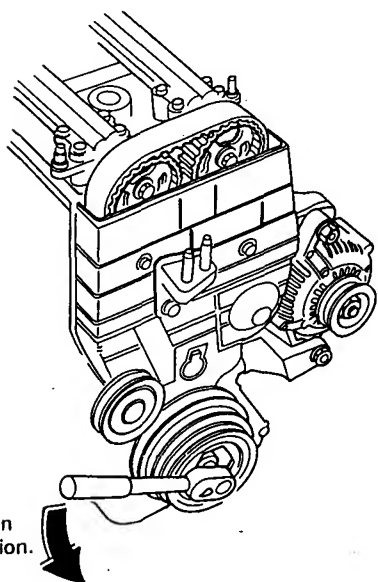
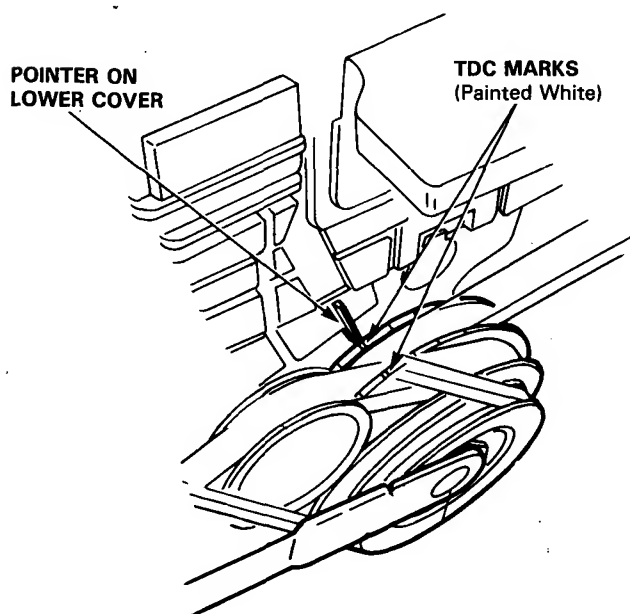
① Timing belt drive pulley (crankshaft) → ② Adjusting pulley → ③ Water pump pulley → ④ Intake camshaft pulley → ⑤ Exhaust camshaft pulley.





4. Loosen the adjusting bolt, and retighten it after tensioning the belt.
5. Rotate the crankshaft about 4 or 6 turns counter-clockwise so that the belt positions on the pulleys.
6. Adjust the timing belt tension (page 6-65).
7. Check the crankshaft pulley and the camshaft pulleys at TDC.

**CRANKSHAFT PULLEY:**



8. If a camshaft pulley is not positioned at TDC, remove the timing belt and adjust the positioning following the procedure on page 6-68, then reinstall the timing belt.

**NOTE:** Refer to page 6-66 for timing belt removal.

After installation, adjust the tension of each belt.

- See section 23 for alternator belt tension adjustment.
- See section 22 for A/C compressor belt tension adjustment.
- See section 17 for P/S pump belt tension adjustment.





## Engine Block

Special Tools .....	7-2
Illustrated Index .....	7-3
Flywheel and Drive Plate	
Replacement .....	7-5
Main Bearings	
Clearance .....	7-6
Selection .....	7-6
Connecting Rod Bearings	
Clearance .....	7-7
Selection .....	7-7
Crankshaft	
Removal .....	7-8
End Play .....	7-9
Inspection .....	7-10
Installation .....	7-20
Cylinder Block	
Inspection .....	7-11
Bore Honing .....	7-12
Pistons	
Inspection .....	7-12
Installation .....	7-13

Piston Rings	
Replacement .....	7-14
End Gap .....	7-14
Ring-To-Groove Clearance .....	7-15
Alignment .....	7-15
Piston Pins	
Removal .....	7-16
Installation (B18A1 engine) .....	7-17
Installation (B17A1 engine) .....	7-17
Inspection .....	7-18
Connecting Rods	
End Play .....	7-19
Selection .....	7-19
Oil Seal	
Installation .....	7-22
Installation	
(engine removal not required) ...	7-22

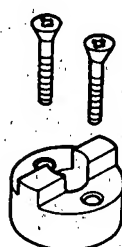


# Special Tools

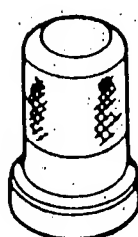
Ref. No	Tool Number	Description	Qty	Page Reference
①	07GAF—PH60300	Piston Pin Base Insert	1	7-16, 17
②	07HAF—PL20102	Piston Base Head	1	7-16, 17
③	07LAD—PR4010A	Seal Driver	1	7-22
④	07LAF—PR30100	Pilot Collar	1	7-16, 17
⑤	07LAB—PV00100 or 07924—PD20003 or 07924—PD20002	Ring Gear Holder	1	7-5
⑥	07948—SB00101	Driver Attachment	1	7-22
⑦	07749—0010000	Driver	1	7-22
⑧	07973—PE00310	Piston Pin Driver Shaft	1	7-16, 17
⑨	07973—PE00320	Piston Pin Driver Head	1	7-16, 17
⑩	07973—6570500	Piston Base	1	7-16, 17
⑪	07973—6570600	Piston Base Spring	1	7-16, 17



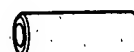
①



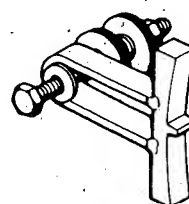
②



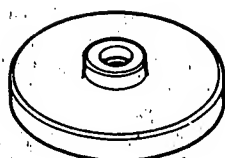
③



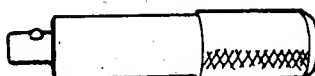
④



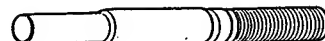
⑤



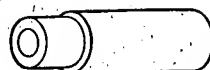
⑥



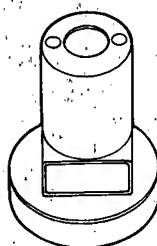
⑦



⑧



⑨



⑩



⑪

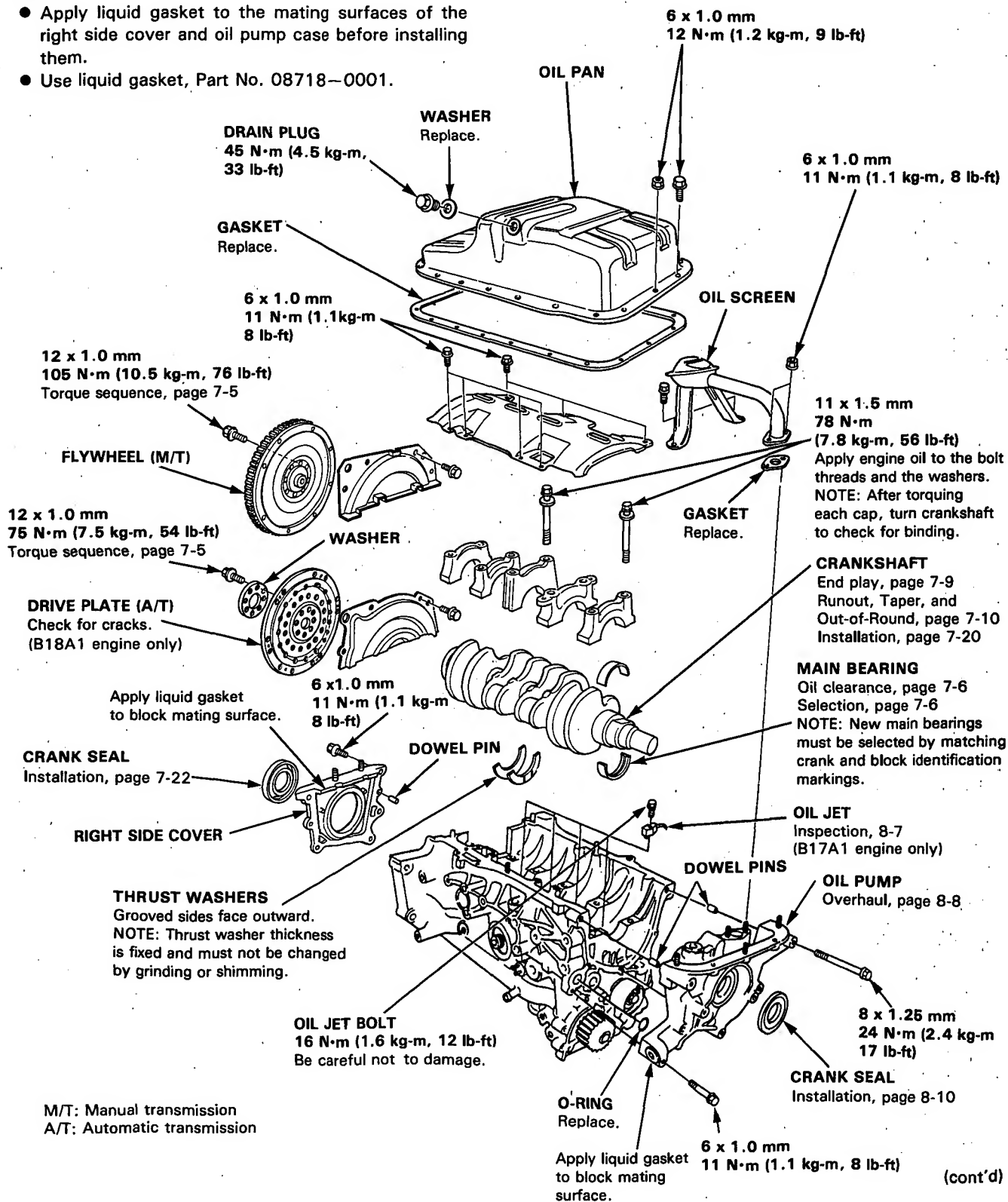
# Illustrated Index



 Lubricate all internal parts with engine oil during reassembly.

## NOTE:

- Apply liquid gasket to the mating surfaces of the right side cover and oil pump case before installing them.
- Use liquid gasket, Part No. 08718-0001.



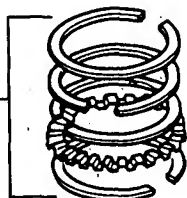
(cont'd)

# Illustrated Index (cont'd)

**NOTE:** New rod bearings must be selected by matching connecting rod and crankshaft identification markings (page 7-7).

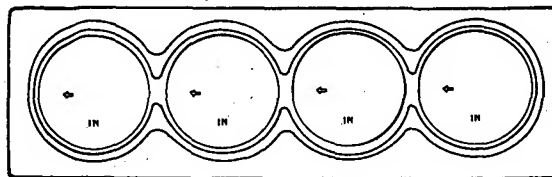
## PISTON RINGS

Replacement, page 7-14  
Measurement, pages 7-14 and 15  
Alignment, page 7-15



## PISTON INSTALLATION DIRECTION

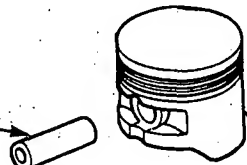
EXHAUST



INTAKE

## PISTON PIN

Removal, page 7-16  
Installation, page 7-17  
Inspection, page 7-18



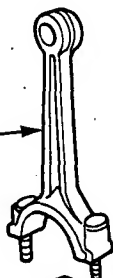
## PISTON

Removal, page 7-9  
Measurement, page 7-12

Inspect top of each cylinder bore for carbon build-up or ridge before removing piston.  
Remove ridge if necessary, page 7-8

## CONNECTING ROD

End play, page 7-19  
Selection, page 7-19  
Small end measurement, page 7-18



## CONNECTING ROD BEARINGS

Clearance, page 7-7  
Selection, page 7-7

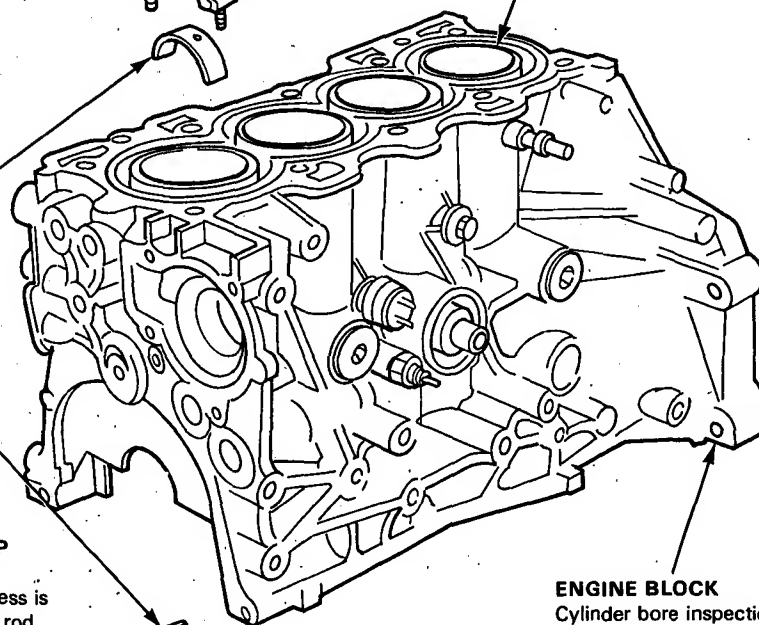
## CONNECTING ROD BEARING CAP

Installation, page 7-20

**NOTE:** Install caps so the bearing recess is on the same side as the recess in the rod.

## CONNECTING ROD NUT

8 x 0.75 mm  
32 N·m (3.2 kg-m, 23 lb-ft)  
After torquing each bearing cap, rotate crankshaft to check for binding.



## ENGINE BLOCK

Cylinder bore inspection, page 7-11  
Warpage inspection, page 7-11  
Cylinder bore honing, page 7-12

# Flywheel and Drive Plate

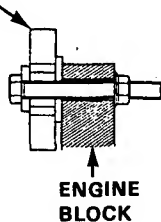


## Replacement

### Manual Transmission:

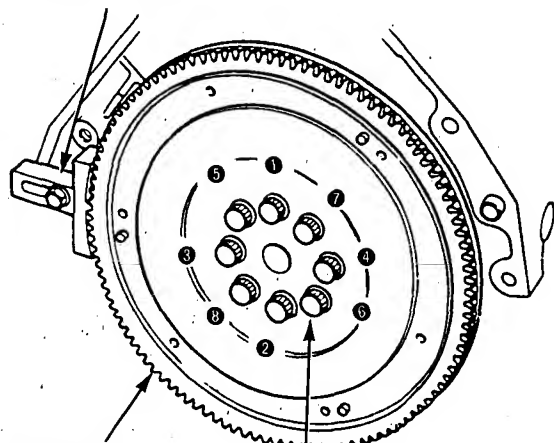
Remove the eight flywheel bolts, then separate the flywheel from the crankshaft flange. After installation, tighten the bolts in the sequence shown.

RING GEAR HOLDER  
07LAB—PV00100,  
07924—PD20003 or  
07924—PD20002



ENGINE  
BLOCK

07LAB—PV00100,  
07924—PD20003 or  
07924—PD20002

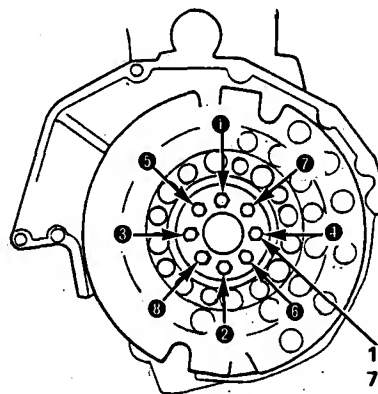


RING GEAR  
Inspect ring gear  
teeth for wear or  
damage.

12 x 1.0 mm  
105 N·m  
(10.5 kg-m, 76 lb-ft)

### Automatic Transmission:

Remove the eight drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in the sequence shown.



12 x 1.0 mm  
75 N·m  
(7.5 kg-m, 54 lb-ft)

# Main Bearings

## Clearance

1. To check main bearing-to-journal oil clearance, remove the main caps and bearing halves.
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.  
NOTE: If the engine is still in the car when you bolt the main cap down to check clearance, the weight of the crankshaft and flywheel will flatten the plastigage further than just the torque on the cap bolt, and give you an incorrect reading. For an accurate reading, support the crank with a jack under the counterweights and check only one bearing at a time.

4. Reinstall the bearings and caps, then torque the bolts to 78 N·m (7.8 kg-m, 56 lb-ft)(page 7-20).  
NOTE: Do not rotate the crankshaft during inspection.

5. Remove the cap and bearings again, and measure the widest part of the plastigage.

### Main Bearing-to-Journal Oil Clearance:

#### Standard (New):

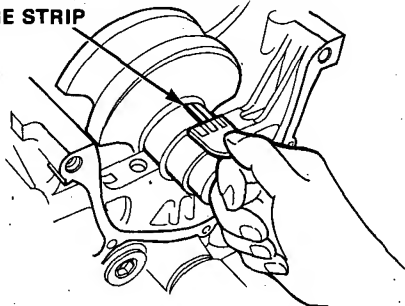
No. 1, 2, 4, 5: 0.024–0.042 mm  
(0.0009–0.0017 in)

Service Limit: 0.050 mm (0.0020 in)

No. 3: 0.030–0.048 mm  
(0.0012–0.0019 in)

Service Limit: 0.060 mm (0.0024 in)

#### PLASTIGAGE STRIP



6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the car), remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code (select the color as shown in the right column), and recheck the clearance.

**CAUTION:** Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check again.

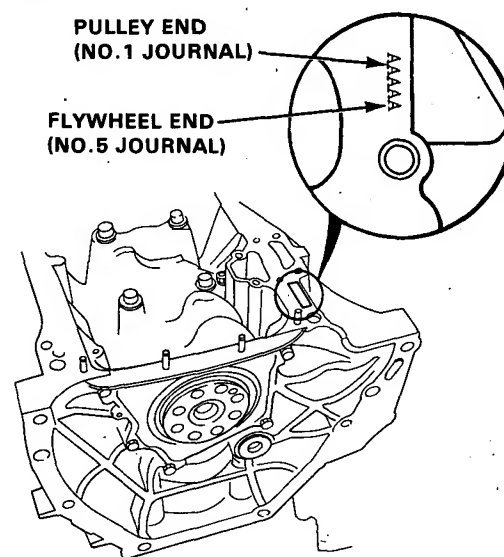
NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

## Selection

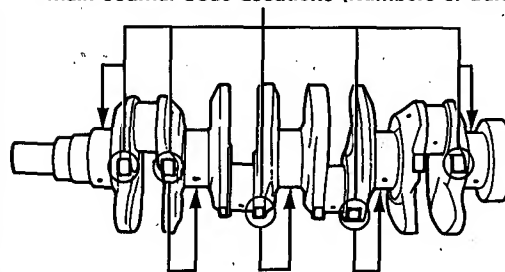
**CAUTION:** If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or driver. Clean them only with washing oil or detergent.

### Crankshaft Bore Code Location (Letters)

Letters have been stamped on the end of the block as a code for the size of each of the 5 main journal bores. Use them, and the numbers or bars stamped on the crank (codes for main journal size), to choose the correct bearings.



### Main Journal Code Locations (Numbers or Bars)



### Bearing Identification

Color code is on the edge of the bearing.

→ Larger crank bore

A	B	C	D
---	---	---	---

→ Smaller bearing (thicker)

1 or I
2 or II
3 or III
4 or IIII

Smaller main journal  
Smaller bearing (thicker)

Red	Pink	Yellow	Green
Pink	Yellow	Green	Brown
Yellow	Green	Brown	Black
Green	Brown	Black	Blue

# Connecting Rod Bearings

## Clearance

1. Remove the connecting rod cap and bearing half.
2. Clean the crankshaft rod journal and bearing half with a clean shop towel.
3. Place the plastigage across the rod journal.
4. Reinstall the bearing half and cap, and torque the nuts to 32 N·m (3.2 kg-m, 23 lb-ft) (page 7-20).

**NOTE:** Do not rotate the crankshaft during inspection.

### Connecting Rod Bearing-to-Journal Oil Clearance:

**B18A1 engine:**

**Standard (New):** 0.020–0.038 mm  
(0.0008–0.0015 in)

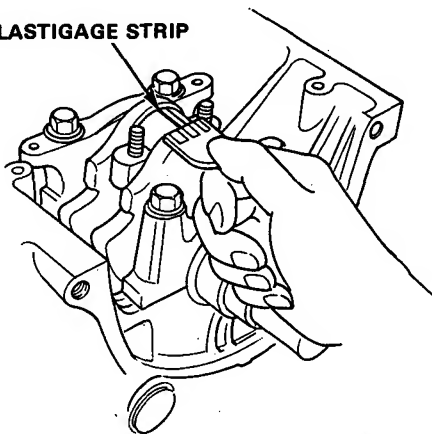
**Service Limit:** 0.050 mm (0.0020 in)

**B17A1 engine:**

**Standard (New):** 0.032–0.050 mm  
(0.0013–0.0020 in)

**Service Limits:** 0.060 mm (0.0024 in)

**PLASTIGAGE STRIP**



6. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color code (select the color as shown in the right column), and recheck the clearance.

**CAUTION:** Do not file, shim, or scrape the bearing or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

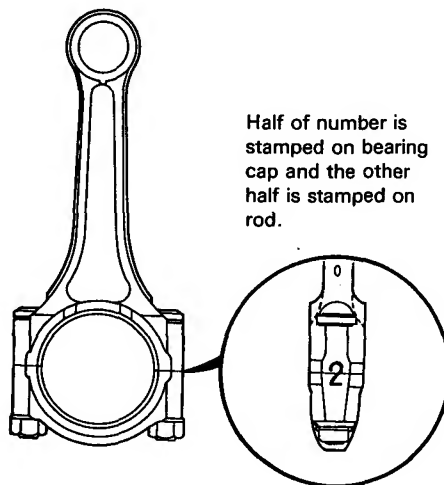
**NOTE:** If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

## Selection

**CAUTION:** If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or driver. Clean them only with washing oil or detergent.

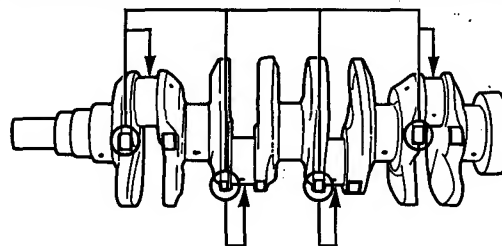
### Connecting Rod Code Location (Numbers)

Number has been stamped on the side of each connecting rod as a code for the size of the big end. Use it, and the letters stamped on the crank (codes for rod journal size), to choose the correct bearings.



Half of number is stamped on bearing cap and the other half is stamped on rod.

### Connecting Rod Journal Code Locations (Letters or Bars)



### Bearing Identification

Color code is on the edge of the bearing.

→ Larger big end bore

1	2	3	4
---	---	---	---

→ Smaller bearing (thicker)

A or I	Red	Pink	Yellow	Green
B or II	Pink	Yellow	Green	Brown
C or III	Yellow	Green	Brown	Black
D or IIII	Green	Brown	Black	Blue

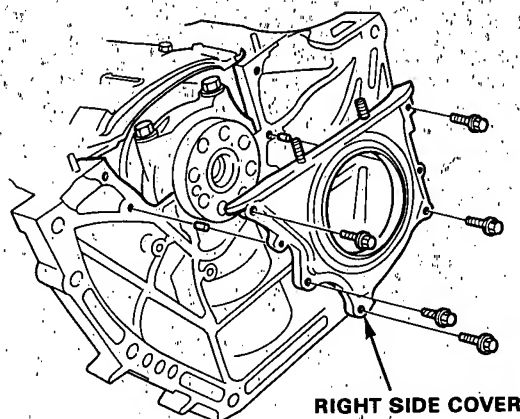
Smaller rod journal

Smaller bearing (thicker)

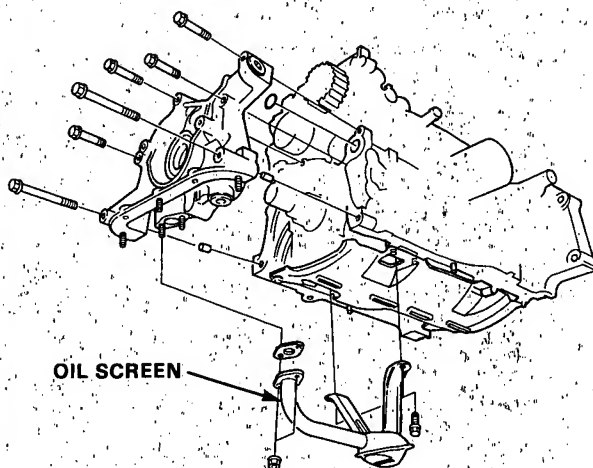
# Crankshaft Removal

**NOTE:** End play for the connecting rods and crankshaft should be inspected before removing the crankshaft.

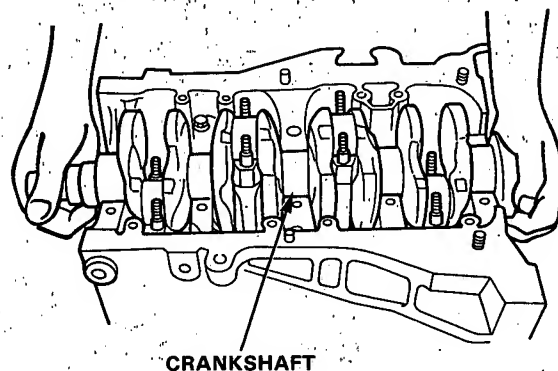
1. Remove the right side cover.



2. Remove the oil screen.

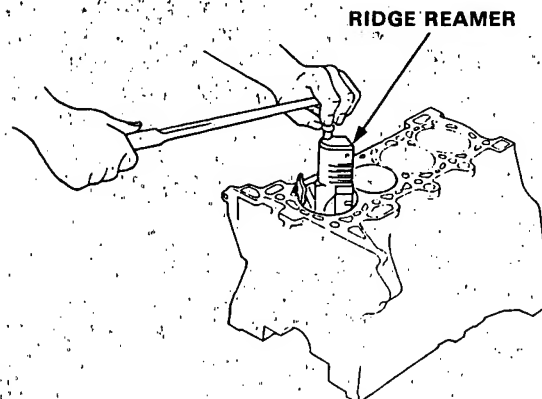


3. Remove the oil pump.
4. Remove the baffle plate.
5. Turn the crankshaft so No.2 and 3 crankpins are at the bottom.
6. Remove the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.
7. Lift the crankshaft out of the engine, being careful not to damage journals.



8. Remove the upper bearing halves from connecting rods and set them aside with their respective caps.
9. Reinstall main caps and bearings on the engine in proper order.
10. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer. Follow the reamer manufacturer's instructions.

**CAUTION:** If the ridge is not removed, it may damage the pistons as they are pushed out.



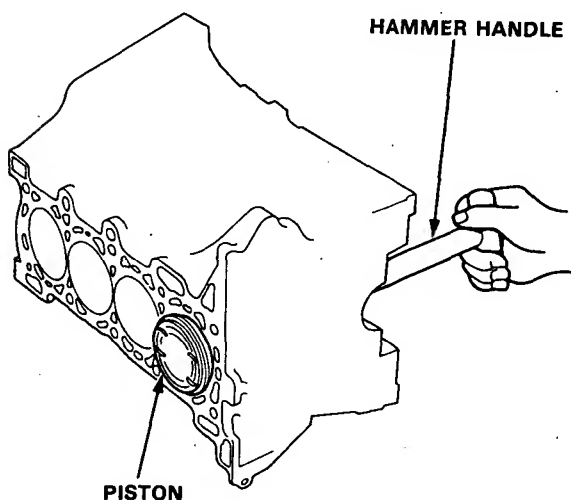




11. Use the wooden handle of a hammer to drive the pistons out.

**CAUTION:**

- Take care not to damage the contact surface of the metal gasket.
- When removing the piston/connecting rod, take care not to hit the oil jet (B17A1 engine only).
- If the oil jet nozzle is damaged or bent, replace the oil jet assembly (B17A1 engine only, page 8-7).



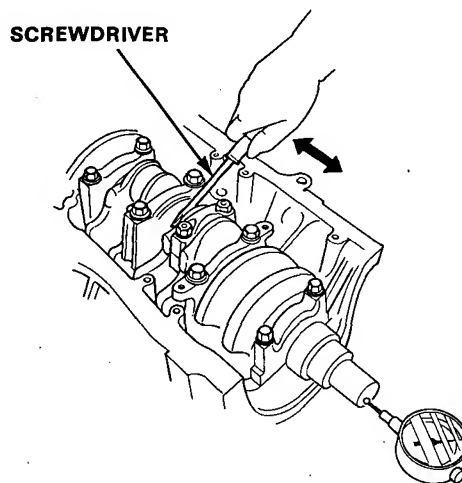
12. Reinstall the rod bearings and caps after removing each piston/connecting rod assembly.
13. Mark each piston/connecting rod assembly with its cylinder number to avoid mixup on reassembly.

**NOTE:** The existing number on the connecting rod does not indicate its position in the engine, it indicates the rod bore size.

## End Play

**NOTE:** End play should be inspected before removing crankshaft.

Push the crank firmly away from the dial indicator, and zero the dial against the end of the crank. Then pull the crank firmly back toward the indicator; dial reading should not exceed service limit.



**Crankshaft End Play:**

**Standard (New):** 0.10–0.35 mm  
(0.04–0.014 in)

**Service Limit:** 0.45 mm (0.018 in)

- If end play is excessive, inspect the thrust washers and thrust surface on the crankshaft. Replace parts as necessary.

**NOTE:**

- Thrust washer thickness is fixed and must not be changed either by grinding or shimming.
- Thrust washers are installed with grooved sides facing outward.

# Crankshaft

## Inspection

### NOTE:

- Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
- Check the keyway and threads.

### Alignment

- Measure runout on all main journals to make sure the crank is not bent.
- The difference between measurements on each journal must not be more than the service limit.

#### Crankshaft Total Indicated Runout:

**B18A1 engine:**

**Standard (New):** 0.03 mm (0.001 in) max.

**Service Limit:** 0.05 mm (0.002 in)

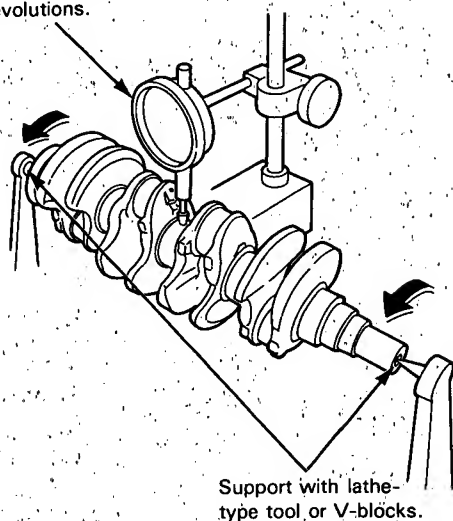
**B17A1 engine:**

**Standard (New):** 0.020 mm (0.0008 in) max.

**Service Limits:** 0.030 mm (0.0012 in)

#### DIAL INDICATOR

Rotate two complete revolutions.



### Out-of-Round and Taper

- Measure out-of-round at the middle of each rod and main journal in two places.
- The difference between measurements on each journal must not be more than the service limit.

#### Journal Out-of-Round:

**B18A1 engine:**

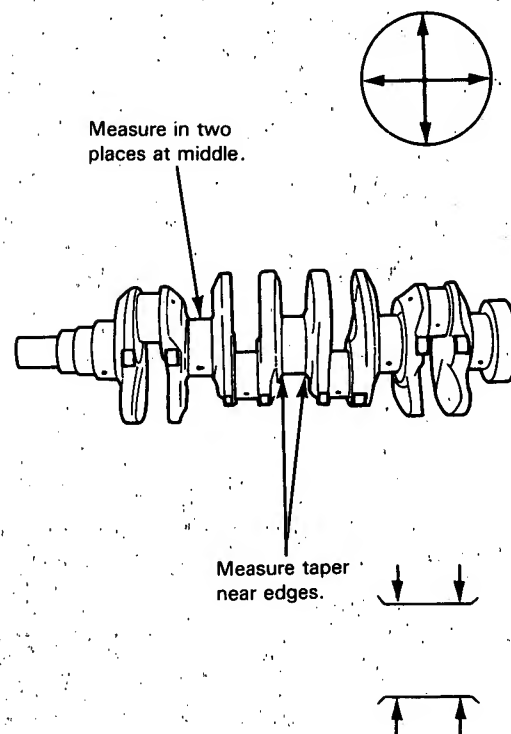
**Standard (New):** 0.005 mm (0.0002 in) max.

**Service Limit:** 0.010 mm (0.0004 in)

**B17A1 engine:**

**Standard (New):** 0.004 mm (0.00016 in) max.

**Service Limit:** 0.006 mm (0.00024 in)



- Measure taper at the edges of each rod and main journal.
- The difference between measurements on each journal must not be more than the service limit.

#### Journal Taper:

**B18A1 engine:**

**Standard (New):** 0.005 mm (0.0002 in) max.

**Service Limit:** 0.010 mm (0.0004 in)

**B17A1 engine:**

**Standard (New):** 0.005 mm (0.0002 in) max.

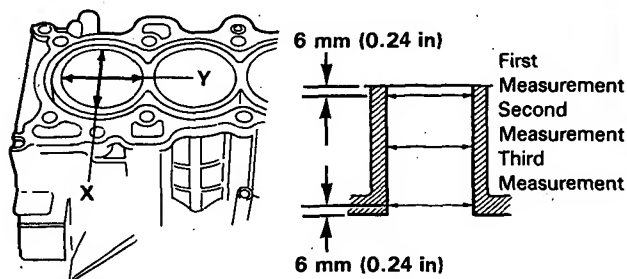
**Service Limit:** —

# Cylinder Block

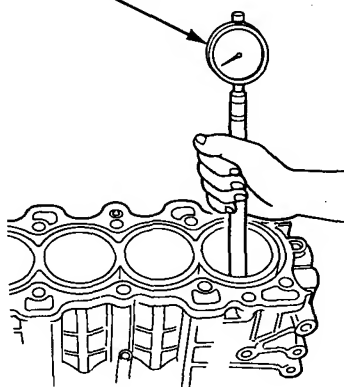


## Inspection

1. Measure wear and taper in direction X and Y at three levels in each cylinder as shown.



CYLINDER BORE GAUGE



### Cylinder Bore Size:

Standard (New): X: 81.000–81.020 mm  
(3.1890–3.1898 in)

Y: 81.000–81.015 mm  
(3.1890–3.1896 in)

Service Limit: 81.07 (3.192 in)

### Oversize:

0.25: 81.250–81.270 mm (3.1988–3.1996 in)

### Bore Taper:

Service Limit: (Difference between first and third measurement) 0.05 mm (0.002 in)

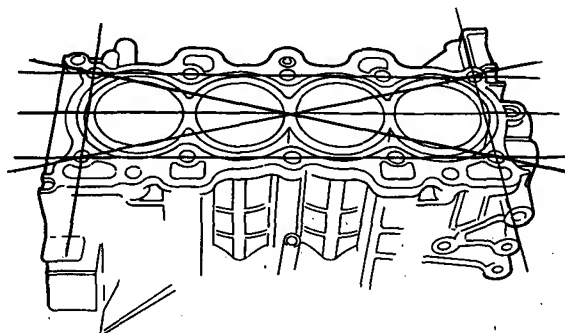
- If measurements in any cylinder are beyond Oversize Bore Service Limit, replace the block.
- If the block is to be rebored, refer to Piston Clearance Inspection (page 7-12) after reboring.

NOTE: Scored or scratched cylinder bores must be honed.

Reboring Limit: 0.25 mm (0.01 in)

2. Check the top of the block for warpage. Measure along the edges and across the center as shown.

SURFACES TO BE MEASURED



### Engine Block Warpage:

#### B18A1 engine:

Standard (New): below 0.07 mm (0.003 in)

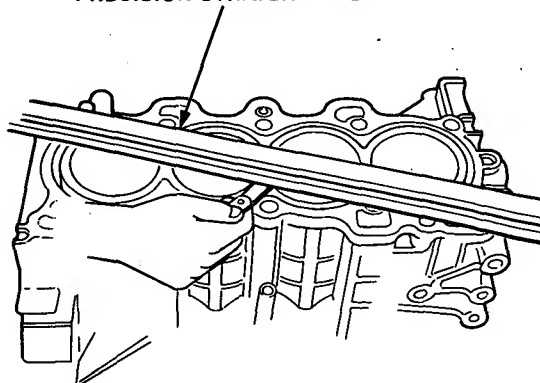
Service Limit: 0.10 mm (0.004 in)

#### B17A1 engine:

Standard (New): below 0.05 mm (0.002 in)

Service Limit: 0.08 mm (0.003 in)

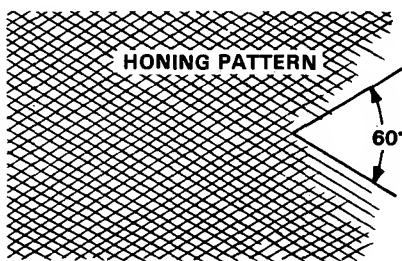
PRECISION STRAIGHT EDGE



# Cylinder Block

## Bore Honing

1. Measure cylinder bores as shown on page 7-11. If the block is to be reused, hone the cylinders and remeasure the bores.
2. Hone cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern.  
**NOTE:**
  - Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent.
  - Do not use stones that are worn or broken.

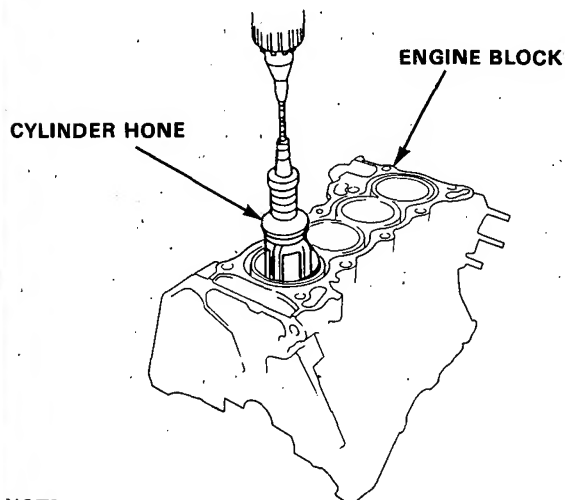


3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil immediately to prevent rusting.

**NOTE:** Never use solvent, it will only redistribute the grit on the cylinder walls.

4. If scoring or scratches are still present in cylinder bores after honing to the service limit, rebore the engine block.

**NOTE:** Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.



**NOTE:**

- After honing, clean the cylinder thoroughly with soapy water.
- Only scored or scratched cylinder bores must be honed.

# Pistons

## Inspection

1. Check the piston for distortion or cracks.

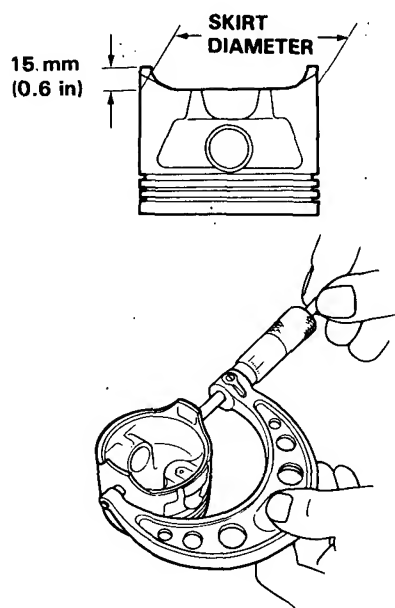
**NOTE:** If the cylinder is bored, an oversized piston must be used.

2. Measure the piston diameter at a point 15 mm (0.6 in) from the bottom of the skirt.

**Piston Diameter:**

**Standard (New):** 80.980–80.990 mm  
(3.1882–3.1886 in)

**Service Limit:** 80.970 mm (3.1878 in)



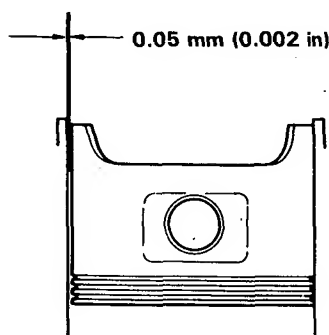


3. Calculate the difference between cylinder bore diameter on (page 7-11) and piston diameter.

**Piston-to-Cylinder Clearance:**

**Standard (New):** 0.010–0.035 mm  
(0.0004–0.0014 in)

**Service Limit:** 0.05 mm(0.002 in)



If the clearance is near or exceeds the service limit, inspect the piston and cylinder block for excessive wear.

**Oversize Piston Diameter:**

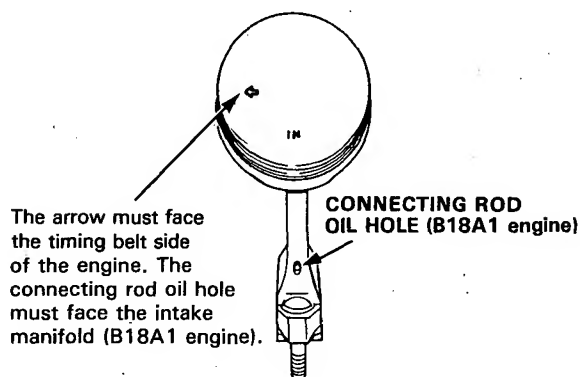
**0.25:** 81.23–81.24 mm (3.1980–3.1984 in)

## Installation

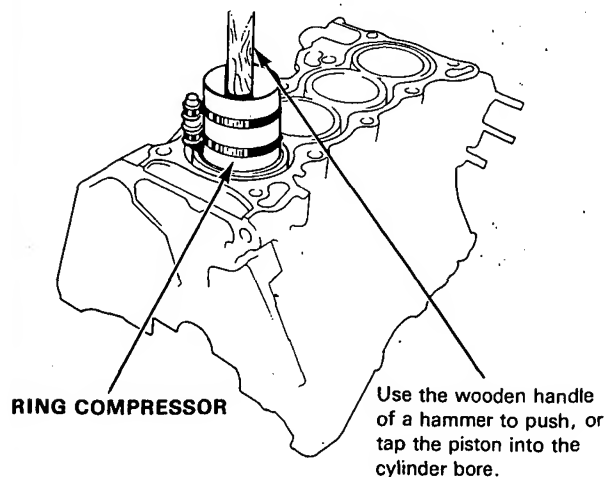


Before installing the piston, apply a coat of engine oil to the ring grooves and cylinder bores.

1. If the crankshaft is already installed:
  - Remove the connecting rod caps and slip short sections of rubber hose over the threaded ends of the connecting rod bolts.
  - Install the ring compressor, check that the bearing is securely in place, then position the piston in the cylinder and tap it in using the wooden handle of a hammer.
  - Stop after the ring compressor pops free and check the connecting rod-to-crank journal alignment before tapping piston into place.
  - Install the rod caps with bearings, then torque the nuts to 32 N·m(3.2 kg-m, 23 lb-ft).
2. If the crankshaft is not installed:
  - Remove the rod caps and bearings, install the ring compressor, then position the piston in the cylinder and tap it in using the wooden handle of a hammer.
  - Position all pistons at top dead center.



**NOTE:** Maintain downward force on the ring compressor to prevent rings from expanding before entering the cylinder bore.



# Piston Rings

## Replacement

1. Using a ring expander, remove old piston rings.

2. Clean all ring grooves thoroughly.

### NOTE:

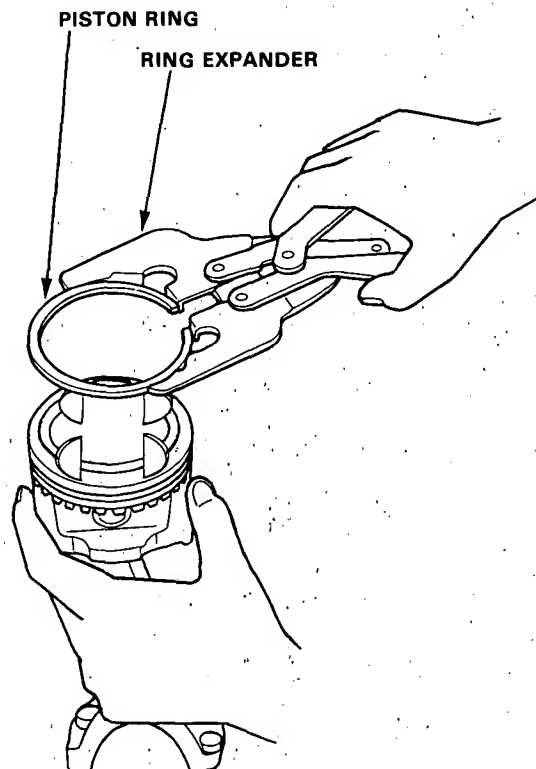
- Use a squared-off broken ring or ring groove cleaner with blade to fit piston grooves.
- Top ring groove is 1.0 mm wide, second groove is 1.2 mm wide, and oil ring groove is 2.8 mm wide.
- File down blade if necessary.

**CAUTION:** Do not use a wire brush to clean the ring lands, or cut ring lands deeper with cleaning tool.

**NOTE:** If the piston is to be separated from the connecting rod, do not install new rings yet.

3. Install new rings in the proper sequence and position (page 7-15).

**NOTE:** Do not use old piston rings.



## End Gap

1. Using a piston, push a new ring into the cylinder bore 15–20 mm (0.6–0.8 in) from the bottom.

2. Measure the piston ring end-gap with a feeler gauge:

- If the gap is too small, check to see if you have the proper rings for your engine.
- If the gap is too large, recheck the cylinder bore diameter against the wear limits on page 7-11. If the bore is over the service limit, the engine block must be rebored.

### Piston Ring End-Gap:

#### Top Ring

Standard (New): 0.20–0.30 mm  
(0.008–0.012 in)\*<sup>1</sup>  
0.20–0.35 mm  
(0.008–0.014 in)\*<sup>2</sup>

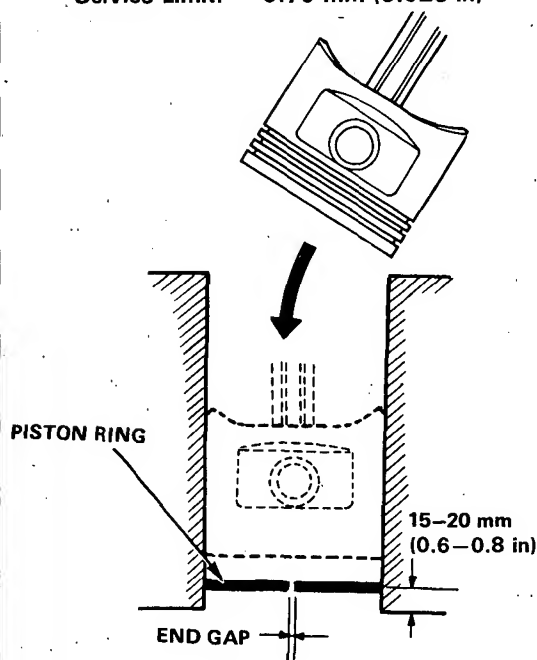
Service Limit: 0.60 mm (0.024 in)

#### Second Ring

Standard (New): 0.40–0.55 mm  
(0.016–0.022 in)  
Service Limit: 0.70 mm (0.028 in)

#### Oil Ring

Standard (New): 0.20–0.45 mm  
(0.008–0.018 in)\*<sup>1</sup>  
0.20–0.50 mm  
(0.008–0.020 in)\*<sup>2</sup>  
Service Limit: 0.70 mm (0.028 in)



\*1: TEIKOKU PISTON RING manufactured piston ring

\*2: RIKEN manufactured piston ring



## Ring-to-Groove Clearance

After installing a new set of rings, measure the ring-to-groove clearances:

### Top Ring Clearance:

Standard (New): 0.045–0.070 mm  
(0.0018–0.0028 in)<sup>\*1</sup>

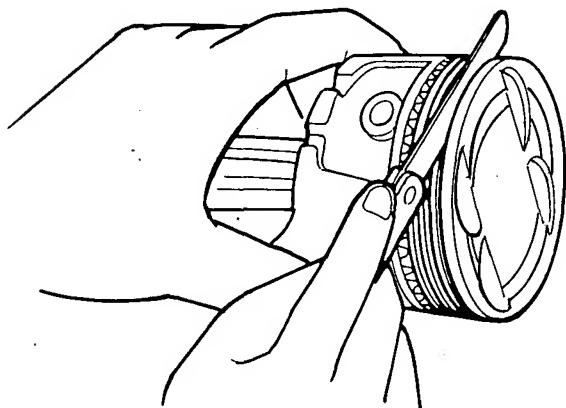
Service Limit: 0.13 mm (0.005 in)

### Second Ring Clearance:

Standard (New): 0.045–0.070 mm  
(0.0018–0.0028 in)<sup>\*1</sup>

0.040–0.065 mm  
(0.0015–0.0026 in)<sup>\*2</sup>

Service Limit: 0.13 mm (0.005 in)



\*1: TEIKOKU PISTON RING manufactured piston ring

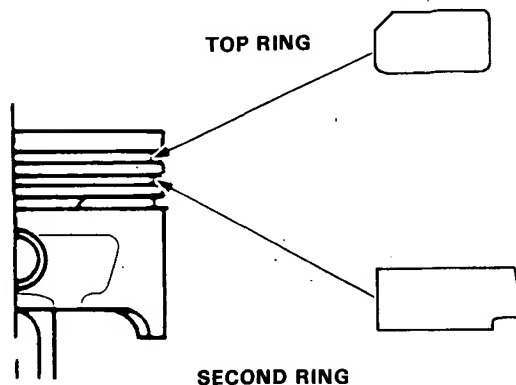
\*2: RIKEN manufactured piston ring

## Alignment

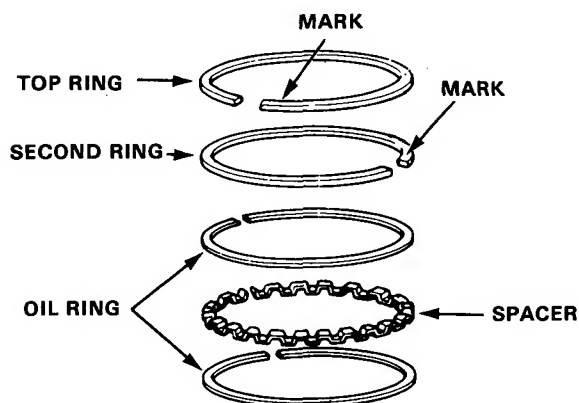
1. Install the rings as shown.

Identify top and second rings by the chamfer on the edge. Make sure they are in their proper grooves on the piston.

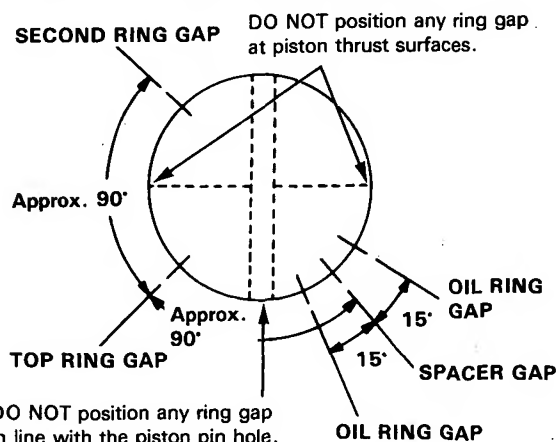
NOTE: The manufacturing marks must be facing upward.



2. Rotate the rings in their grooves to make sure they do not bind.



3. Position the ring end gaps as shown:



# Piston Pins

## Removal

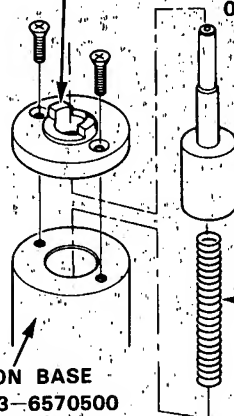
1. Assemble the Piston Pin Tools as shown.

PISTON BASE HEAD  
07HAF-PL20102

PISTON PIN BASE INSERT  
07GAF-PH60300

PISTON BASE SPRING  
07973-6570600

PISTON BASE  
07973-6570500



2. Adjust the length A of the piston pin driver.

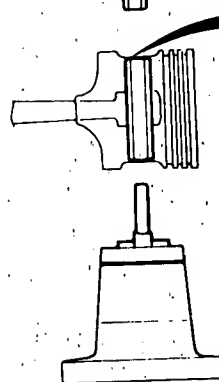
A: B18A1 engine: 49.70 mm (1.957 in)  
B17A1 engine: 51.70 mm (2.035 in)

PISTON PIN DRIVER HEAD  
07973-PE00320

PISTON PIN DRIVER SHAFT  
07973-PE00310

PILOT COLLAR  
07LAF-PR30100

Embossed mark facing up.



NOTE: Use a hydraulic press.  
When pressing pin in or out,  
make sure that the recessed  
portion of the piston aligns  
with the lips on the collar.

3. Place the piston on the piston base and press the pin out with a hydraulic press.

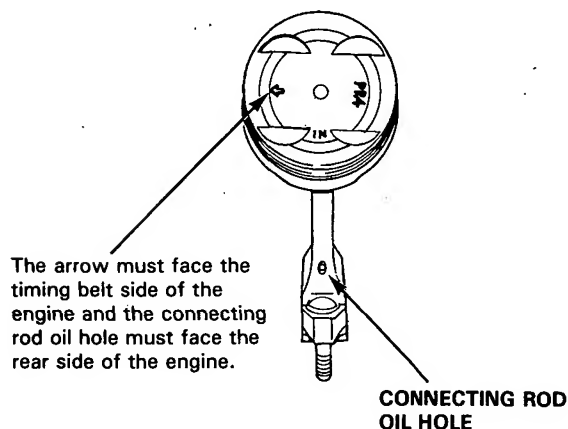




## Installation (B18A1 engine)

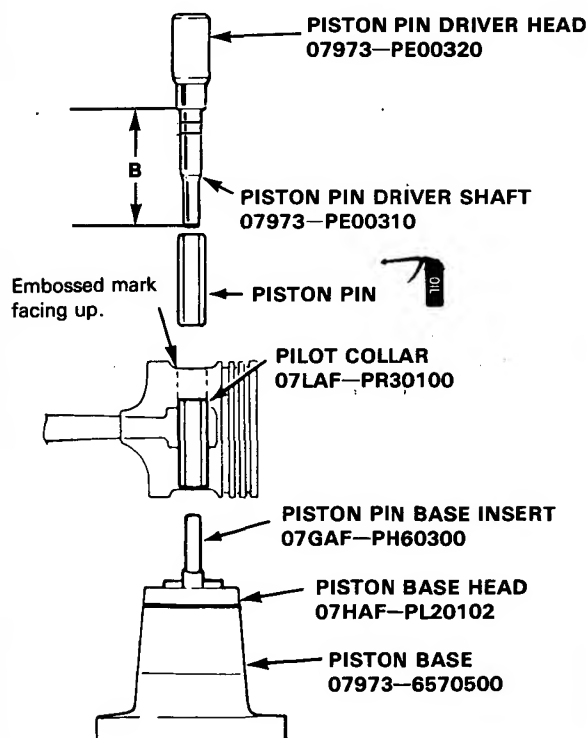
1. Use a hydraulic press for installation.

- When pressing the pin in or out, be sure to position the recessed flat on the piston against the lugs on the base attachment.



2. Adjust the length B of the piston pin driver.

**B: 49.70 mm (1.957 in)**

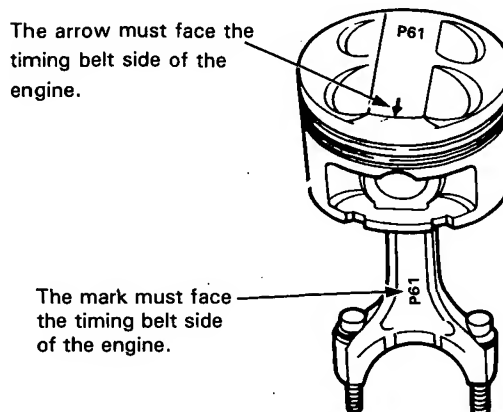


**NOTE:** Install the assembled piston and rod with the oil hole facing the intake manifold.

## Installation (B17A1 engine)

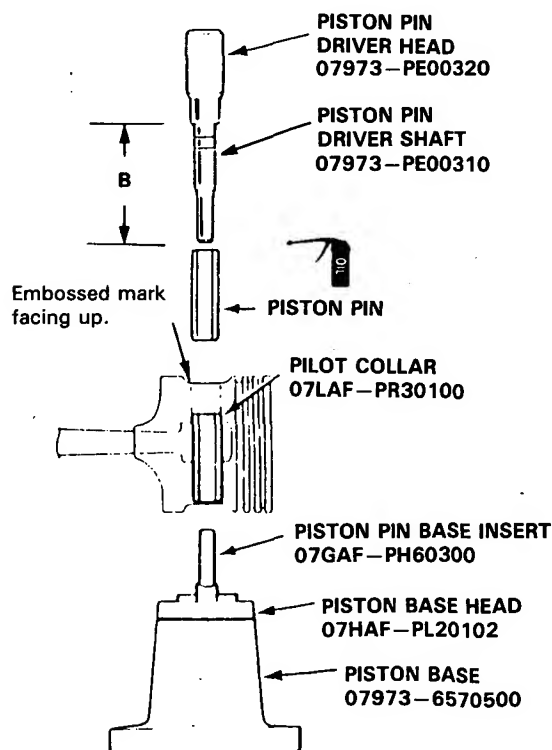
1. Use a hydraulic press for installation.

- When pressing pin in or out, be sure you position the recessed flat on the piston against the lugs on the base attachment.



2. Adjust the length B of piston pin driver.

**B: 51.70 mm (2.035 in)**



# Piston Pins

## Inspection

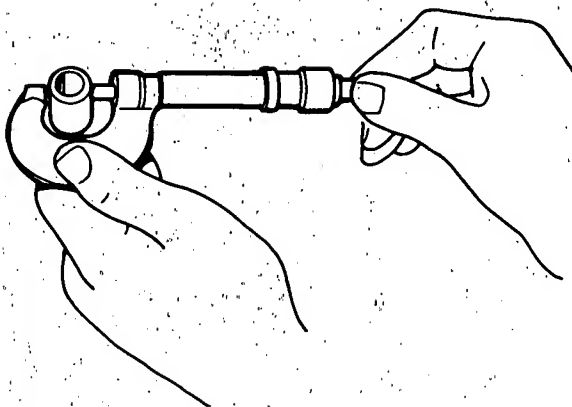
1. Measure the diameter of the piston pin.

### Piston Pin Diameter:

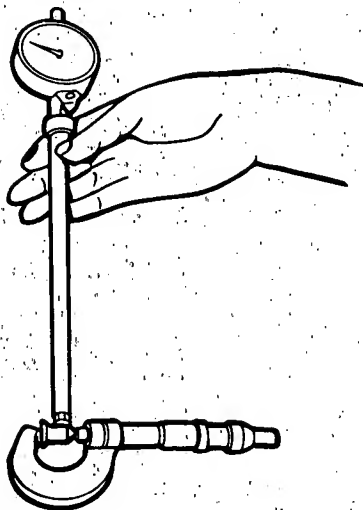
Standard (New): 20.994–21.000 mm  
(0.8265–0.8268 in)

Oversize: 20.997–21.003 mm  
(0.8267–0.8269 in)

NOTE: All replacement piston pins are oversize.



2. Zero the dial indicator to the piston pin diameter.



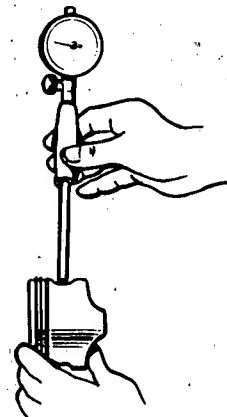
3. Measure the piston pin-to-piston clearance.

NOTE: Check the piston for distortion or cracks.

If the piston pin clearance is greater than 0.022 mm (0.0009 in), remeasure using an oversize piston pin.

### Piston Pin-to-Piston Clearance:

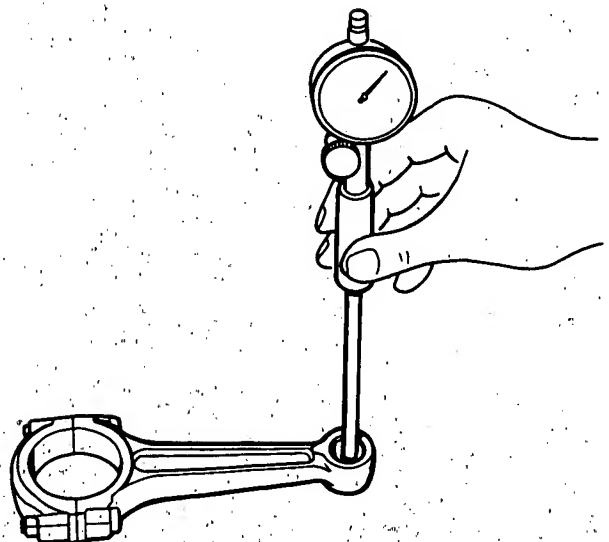
Standard (New): 0.010–0.022 mm  
(0.0004–0.0009 in)



4. Check the difference between piston pin diameter and connecting rod small end diameter.

### Piston Pin-to-Connecting Rod Interference:

Standard (New): 0.013–0.032 mm  
(0.0005–0.0013 in)



# Connecting Rods



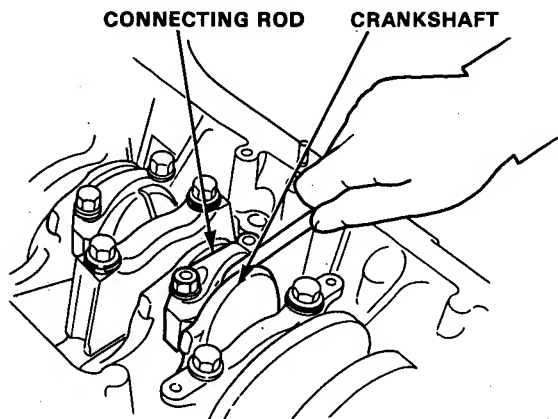
## End Play

**NOTE:** End play should be inspected before removing the crankshaft.

### Connecting Rod End Play:

**Standard (New):** 0.15–0.30 mm  
(0.006–0.012 in)

**Service Limit:** 0.40 mm (0.016 in)



- If out-of-tolerance, install a new connecting rod.
- If still out-of-tolerance, replace the crankshaft (page 7-8 and 7-20)

## Selection

Each rod falls into one of four tolerance ranges (from 0 to + 0.024 mm, in 0.006 mm increments) depending on the size of its big end bore. It's then stamped with a number (1, 2, 3, or 4) indicating the range. You may find any combination of 1, 2, 3, or 4 in any engine.

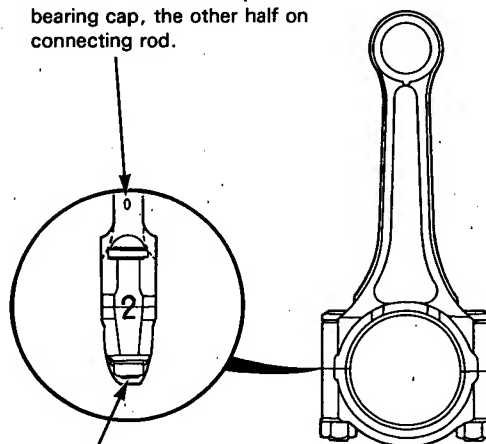
**Normal Bore Size:** 48.0 mm (1.89 in)

### NOTE:

- Reference numbers are for big end bore size and do NOT indicate the position of the rod in the engine.
- Inspect connecting rod for cracks and heat damage.

### CONNECTING ROD BORE REFERENCE NUMBER

Half of number is stamped on bearing cap, the other half on connecting rod.



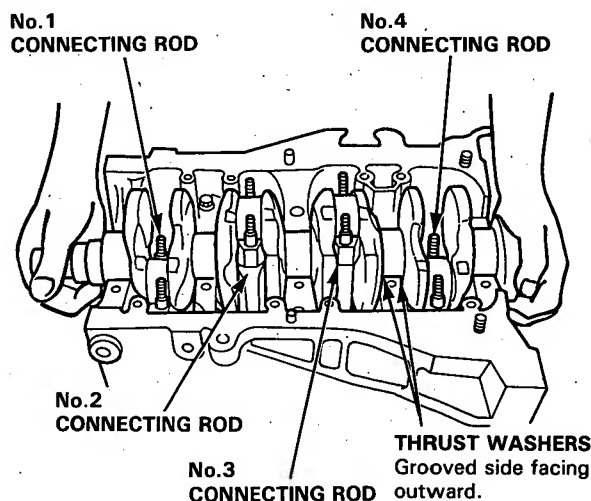
Inspect bolts and nuts for stress cracks.

# Crankshaft

## Installation

**NOTE:** Before installing the crankshaft, apply a coat of engine oil to the main bearings and rod bearings.

1. Insert bearing halves in the engine block and connecting rods.
2. Hold the crankshaft so rod journals for cylinders No. 2 and No. 3 are straight up.
3. Lower the crankshaft into the block, seating the rod journals into connecting rods No. 2 and No. 3. Install the rod caps and nuts finger tight.



4. Rotate the crankshaft clockwise, seat journals into connecting rods No. 1 and No. 4, and install the rod caps and nuts finger tight.

**NOTE:** Install caps so the bearing recess is on the same side as the recess in the rod.

5. Check rod bearing clearance with plastigage (page 7-7) then tighten the capnuts in 2 steps.

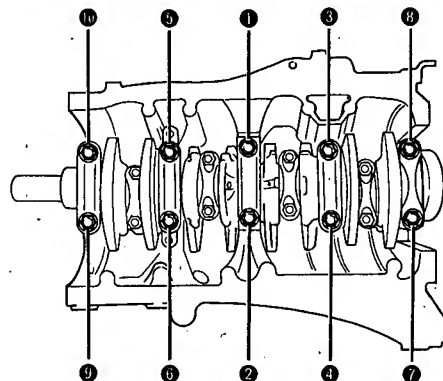
1st step: 20 N·m (2.0 kg-m, 14 lb-ft)

2nd step: 32 N·m (3.2 kg-m, 23 lb-ft)

**NOTE:** Reference numbers on connecting rod are for big-end bore tolerance and do NOT indicate the position of piston in the engine.

6. Install the thrust washers and main bearing caps. Check clearance with plastigage (page 7-6), then tighten the bearing cap bolts in 2 steps. In the first step tighten all bolts in sequence to about 30 N·m (3.0 kg-m, 22 lb-ft); in the final step tighten in same sequence to 78 N·m (7.8 kg-m, 56 lb-ft).

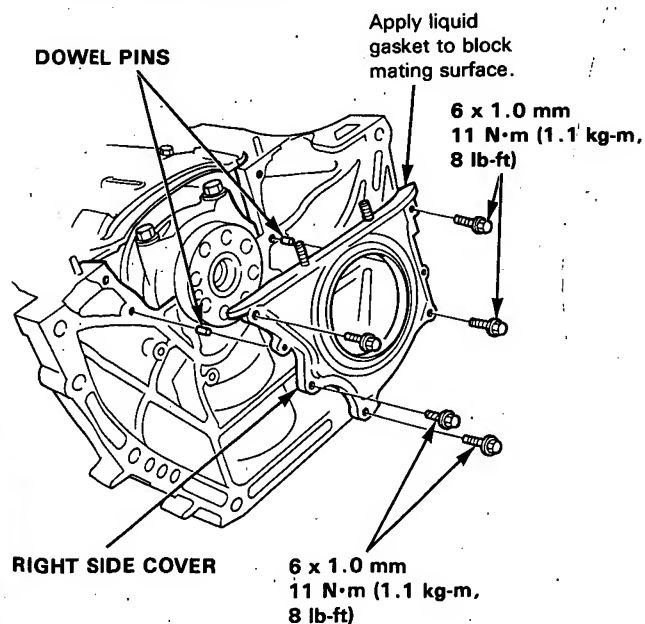
**NOTE:** Coat the bolt threads with oil.



**CAUTION:** Whenever any crankshaft or connecting rod bearing is replaced, it is necessary after reassembly to run the engine at idling speed until it reaches normal operating temperature, then continue to run it for approximately 15 minutes.

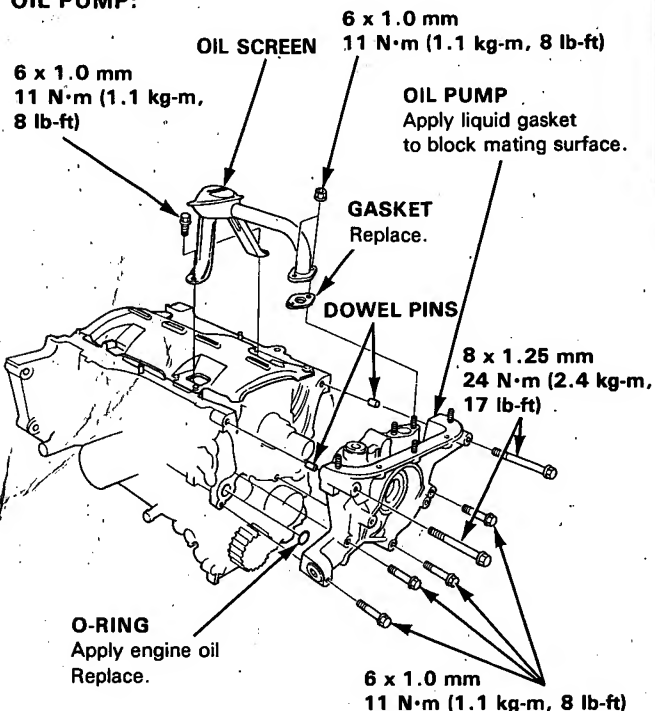
7. Install the baffle plate.
8. Apply non-hardening liquid gasket to the block mating surface of the right side cover and oil pump, and install them on the engine block.

### RIGHT SIDE COVER:





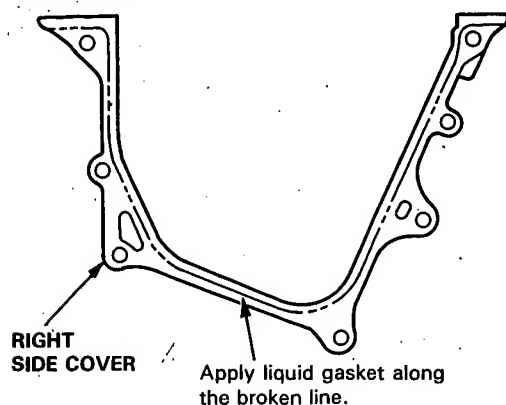
## OIL PUMP:



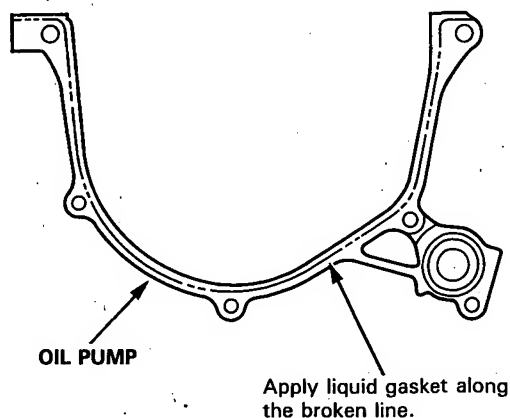
## NOTE:

- Use liquid gasket, Part No. 08718-0001.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket as an even bead, centered between the edges of the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if 20 minutes or more have elapsed since applying the liquid gasket. Instead, reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.

## RIGHT SIDE COVER:

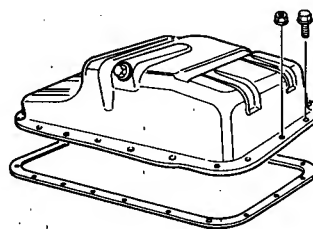


## OIL PUMP:

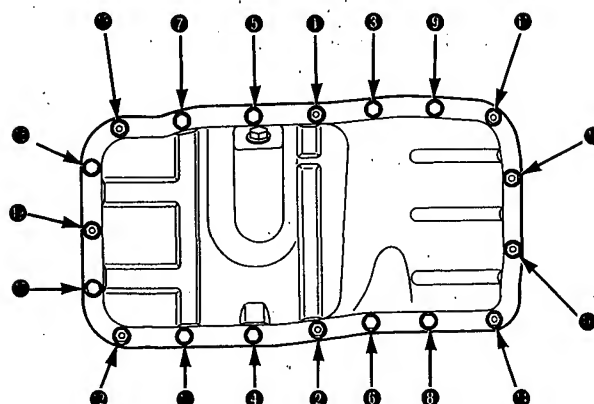


9. Install the oil screen.

10. Install the oil pan.



11. Tighten the bolts as shown below.  
Torque: 12 N·m (1.2 kg-m, 9 lb-ft)



NOTE: Tighten the bolts and nuts in two steps and torque the bolts in a criss-cross pattern.

# Oil Seal

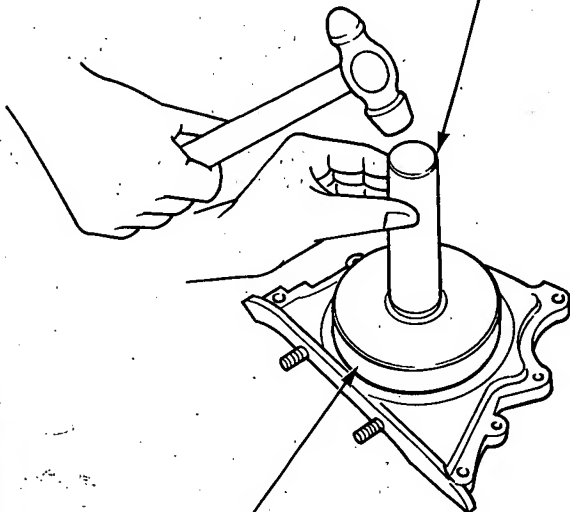
## Installation



The seal surface on the block should be dry.  
Apply a light coat of oil to the crankshaft and to the lip of the seal.

1. Drive in flywheel end seal against right side cover.  
NOTE: Drive the end seal in squarely.

**DRIVER**  
07749-0010000

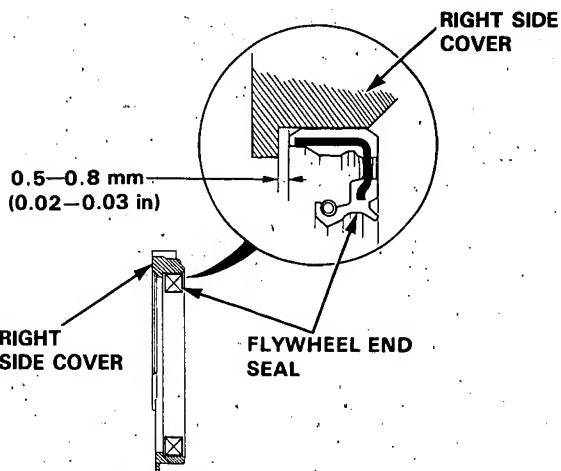


**DRIVER ATTACHMENT**  
07948-SB00101

Install seal with the  
part number side  
facing out.

2. Confirm that clearance is equal all the way around with a feeler gauge.

Clearance: 0.5–0.8 mm (0.02–0.03 in)



NOTE: Refer to right column and 8-10 for installation of the oil pump side oil seal.

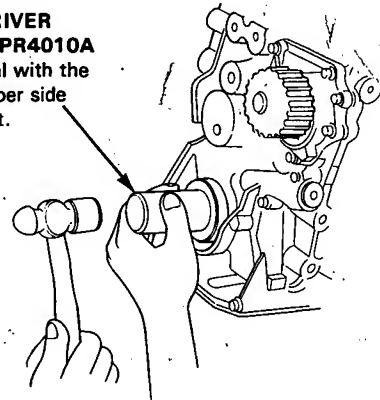
## Installation (engine removal not required)



The seal surface on the block should be dry.  
Apply a light coat of grease to the crankshaft and to the lip of seal.

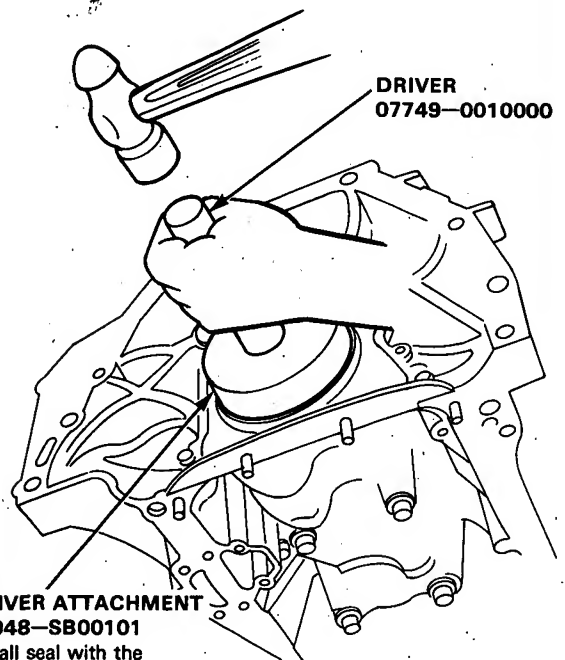
1. Using the special tool, drive in the timing pulley-end seal until the driver bottoms against the oil pump. When the seal is in place, clean any excess grease off the crankshaft and check that the oil seal lip is not distorted.

**SEAL DRIVER**  
07LAD-PR4010A  
Install seal with the  
part number side  
facing out.



2. Using the special tool, drive in the flywheel-end seal until the driver bottoms against block.

NOTE: Align the hole in the driver attachment with the pin on the crankshaft.



**DRIVER ATTACHMENT**  
07948-SB00101  
Install seal with the  
part number side  
facing out.

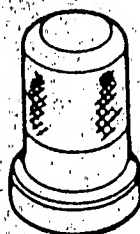
## **Engine Lubrication**

<b>Special Tools .....</b>	<b>8-2</b>
<b>Illustrated Index .....</b>	<b>8-3</b>
<b>Engine Oil</b>	
<b>Inspection .....</b>	<b>8-4</b>
<b>Replacement .....</b>	<b>8-4</b>
<b>Oil Filter Replacement .....</b>	<b>8-5</b>
<b>Oil Pressure Testing .....</b>	<b>8-7</b>
<b>Oil Jet Inspection .....</b>	<b>8-7</b>
<b>Oil Pump</b>	
<b>Overhaul .....</b>	<b>8-8</b>
<b>Removal/Inspection/Installation .....</b>	<b>8-9</b>

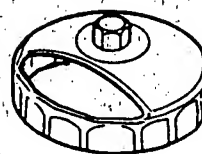


# Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07LAD—PR4010A	Seal Driver	1	8-10
②	07912—6110001	Oil Filter Wrench	1	8-6



①



②



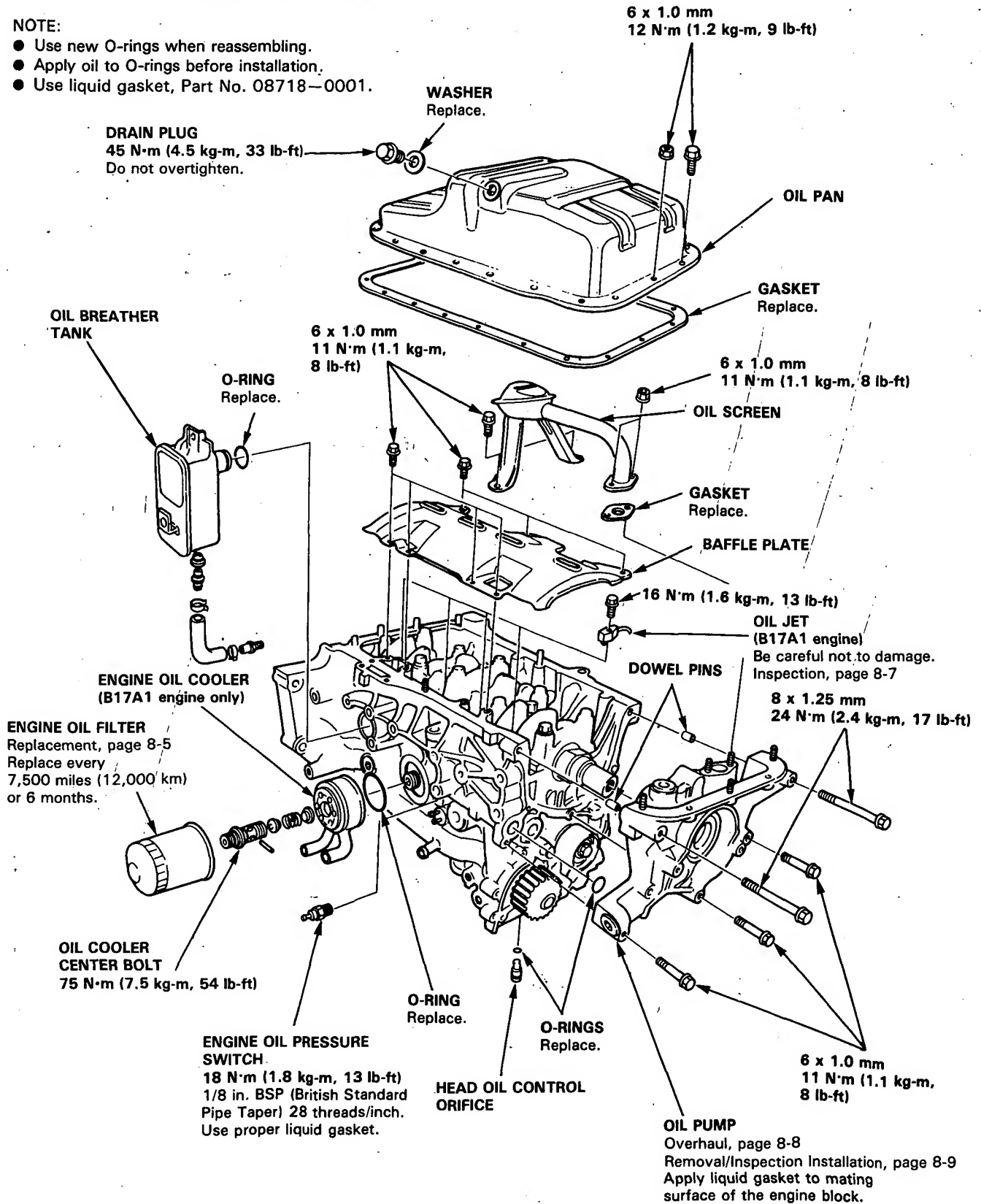
# Illustrated Index



**CAUTION:** Do not overtighten the drain plug.

**NOTE:**

- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718-0001.

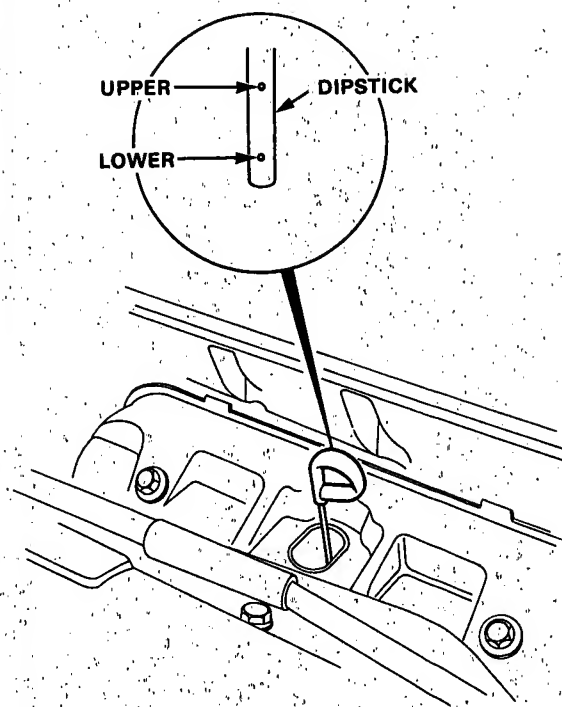


# Engine Oil

## Inspection

1. Check engine oil with the engine off and the car parked on level ground.
2. Make certain that the oil level indicated on the dipstick is between the upper and lower marks.
3. If the level has dropped close to the lower mark, add oil until it reaches the upper mark.

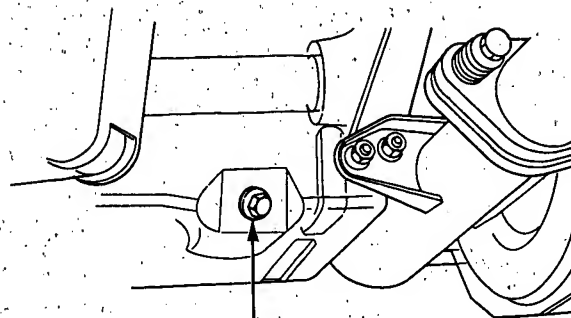
**CAUTION:** Insert the dipstick carefully to avoid bending it.



## Replacement

**CAUTION:** Remove the drain plug carefully while the engine is hot, the hot oil may cause scalding.

1. Warm up the engine.
2. Drain the engine oil.



**DRAIN PLUG**  
45 N·m (4.5 kg-m, 33 lb-ft)

3. Reinstall the drain plug with a new washer, and refill with the recommended oil.

**CAUTION:** Do not overtighten the drain plug.

Requirement	API Service Grade: Use "Energy Conserving II" SG grade oil. B18A1 engine: 5W-30 preferred. B17A1 engine: 10W-30 preferred.
Capacity	B18A1 engine: 3.8 l (4.0 US qt, 3.3 Imp qt) at change, including filter. 4.6 l (4.9 US qt, 4.0 Imp qt) after engine overhaul. B17A1 engine: 4.0 l (4.2 US qt, 3.5 Imp qt) at change, including filter. 4.8 l (5.1 US qt, 4.2 Imp qt) after engine overhaul.
Change	Every 7,500 miles (12,000 km) or 6 months



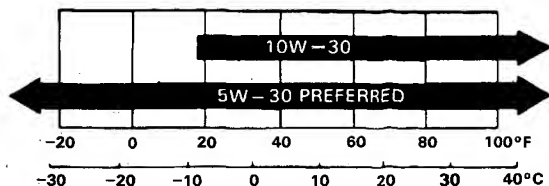
## Engine Oil Filter

### Replacement

The numbers in the middle of the API Service label tell you the oil's SAE viscosity or weight. Select the oil for your car according to this chart:

#### B18A1 engine:

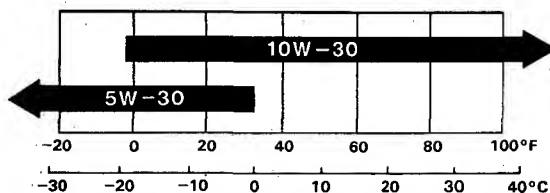
Ambient Temperature



An oil with a viscosity of 5W-30 is preferred for improved fuel economy and year-round protection in the car. You may use a 10W-30 oil if the climate in your area is limited to the temperature range shown on the chart.

#### B17A1 engine:

Ambient Temperature



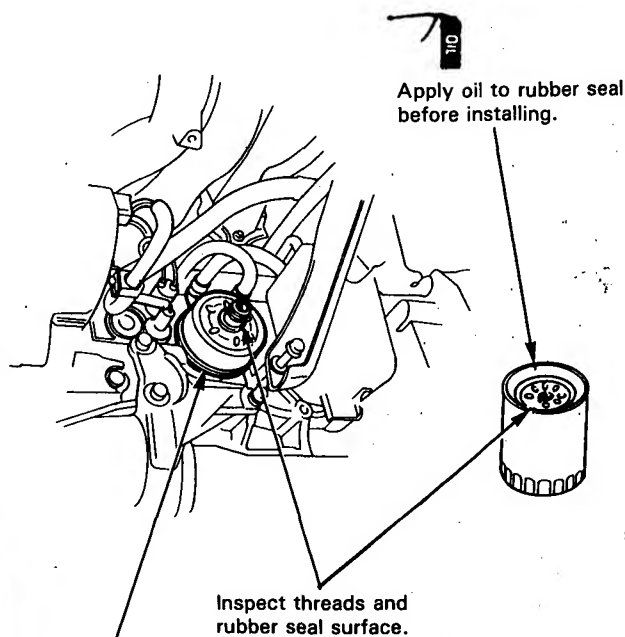
An oil with a viscosity of 10W-30 is preferred for improved fuel economy and year-round protection in the car. You may use a 5W-30 oil if the climate in your area is within the temperature range shown on the chart.

**NOTE:** The oil filter should be replaced at each oil change.

**CAUTION:** After the engine has been run, the exhaust pipes will be hot; be careful when working around the exhaust manifold.

1. Remove the oil filter with the special oil filter wrench.
2. Inspect the threads and rubber seal on the new filter. Wipe off seat on engine block, then apply a light coat of oil to the filter rubber seal.

**NOTE:** Use only filters with a built-in bypass system.



**ENGINE OIL COOLER**  
(B17A1 engine only)

# Oil Filter

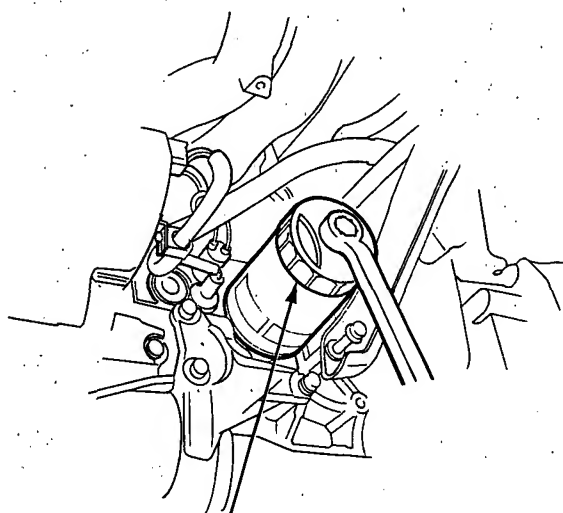
## Replacement (cont'd)

3. Install the oil filter by hand.
4. After the rubber seal seats, tighten the oil filter clockwise with the special tool.

**Tighten: 7/8 turn clockwise.**

**Tightening torque: 22 N·m (2.2 kg-m, 16 lb-ft)**

**CAUTION:** Installation other than the above procedure could result in serious engine damage due to oil leakage.

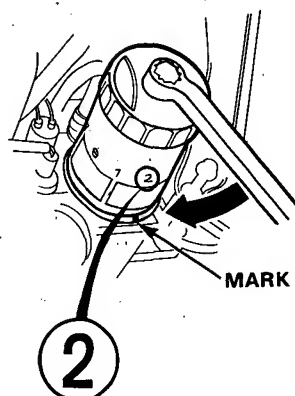


**OIL FILTER WRENCH**  
07912-6110001

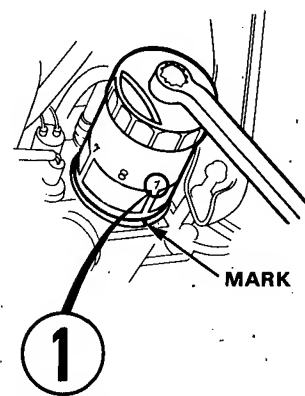
Eight numbers (1 to 8) are printed on the surface of the filter.

The following explains the procedure for tightening filters using these numbers.

- 1) Make a mark on the cylinder block under the number that shows at the bottom of the filter when the rubber seal is seated.
- 2) Tighten the filter by turning it clockwise seven numbers from the marked point. For example, if a mark is made under the number 2 when the rubber seal is seated, the filter should be tightened until the number 1 comes up to the marked point.



Number when rubber seal is seated.



Number after tightening.

Number when rubber seal is seated	1	2	3	4	5	6	7	8
Number after tightening	8	1	2	3	4	5	6	7

5. After installation, fill the engine with oil up to the specified level, run the engine for more than 3 minutes, then check for oil leakage.

# Oil Pressure

## Testing

If the oil pressure warning light stays on with the engine running, check the engine oil level. If the oil level is correct:

1. Connect a tachometer.
2. Remove the oil pressure switch and install an oil pressure gauge.
3. Start the engine. Shut it off immediately if the gauge registers no oil pressure. Repair the problem before continuing.
4. Allow the engine to reach operating temperature (fan comes on at least twice). The pressure should be:

### Engine Oil Pressure:

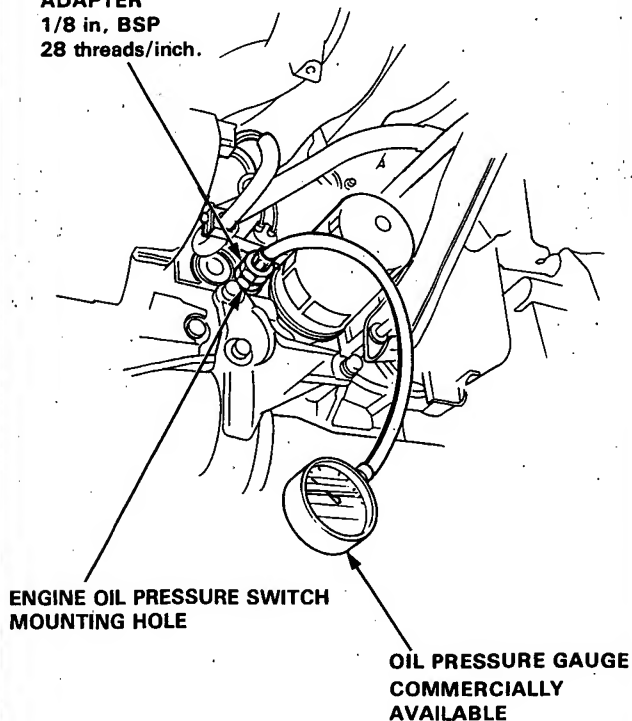
Oil temperature: 176°F (80°C)

At Idle: 70 kPa (0.7 kg/cm<sup>2</sup>, 10 psi)  
minimum

At 3,000 rpm: 350 kPa (3.5 kg/cm<sup>2</sup>, 50 psi)  
minimum

- If oil pressure is within specifications, replace the engine oil pressure switch and recheck.
- If oil pressure is NOT within specifications, inspect the oil pump (page 8-9 and 10).

ADAPTER  
1/8 in, BSP  
28 threads/inch.



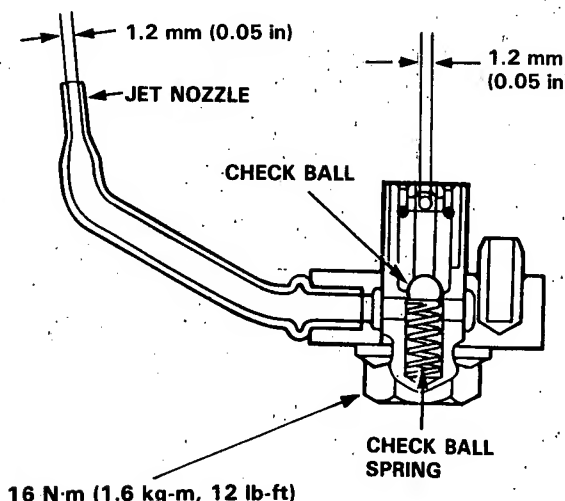
# Oil Jet



## Inspection (B17A1 engine only)

1. Remove the oil jet (page 8-3) and inspect it as follows.
  - Make sure that a 1.1 mm (0.04 in) diameter drill will go through the nozzle hole (1.2 mm (0.05 in) dia.).
  - Insert the other end of the same 1.1 mm (0.04 in) drill into the oil intake (1.2 mm (0.05 in) dia.). Make sure the check ball moves smoothly and has a stroke of approximately 4.0 mm (0.16 in).
  - Check the oil jet operation with an air nozzle. It should take at least 200 kPa (2.0 kg/cm<sup>2</sup>, 28 psi) to unseat the check ball.

NOTE: Replace the oil jet assembly if the nozzle is damaged or bent.



2. Mounting torque is critical. Be very precise when installing.

Torque: 16 N·m (1.6 kg-m, 12 lb-ft)

# Oil Pump

## Overhaul

### NOTE:

- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718-0001.

6 x 1.0 mm  
6 N·m (0.6 kg-m, 4 lb-ft)

OUTER ROTOR  
Inspection, page 8-9

O-RING  
Replace.  
Apply liquid gasket.

DOWEL PIN

6 x 1.0 mm  
11 N·m (1.1 kg-m, 8 lb-ft)

PUMP COVER  
Inspection, page 8-9

INNER ROTOR  
Inspection, page 8-9

DOWEL PIN

PUMP HOUSING  
Inspection, page 8-9

OIL SEAL  
Installation, page 8-10  
Replace.

8 x 1.25 mm  
24 N·m (2.4 kg-m, 17 lb-ft)

8 x 1.25 mm  
24 N·m (2.4 kg-m, 17 lb-ft)



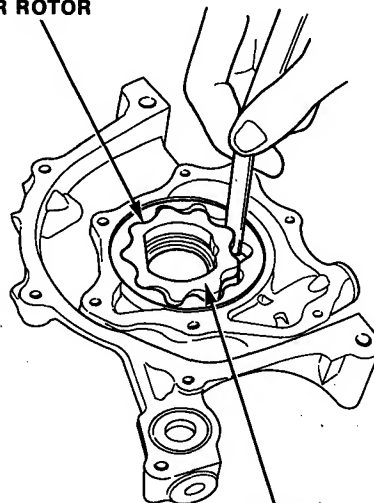
## Removal/Inspection/Installation

1. Drain the engine oil.
2. Turn the crankshaft and align the white groove on the crankshaft pulley with the pointer on the lower cover.
3. Remove the cylinder head cover and middle cover.
4. Remove the power steering pump belt, air conditioner belt and the alternator belt.
5. Remove the crankshaft pulley and remove the lower cover.
6. Remove the timing belt and drive pulley.
7. Remove the driven pulleys and timing belt back cover.
8. Remove the oil pan and oil screen.
9. Remove the mounting bolts and the oil pump assembly.

10. Remove the screws from the pump housing, then separate the housing and cover.
11. Check the inner-to-outer rotor radial clearance on the pump rotor.

**Inner Rotor-to-Outer Rotor Radial Clearance**  
**Standard (New):** 0.04–0.16 mm  
 (0.002–0.006 in)  
**Service Limit:** 0.20 mm (0.008 in)

**OUTER ROTOR**

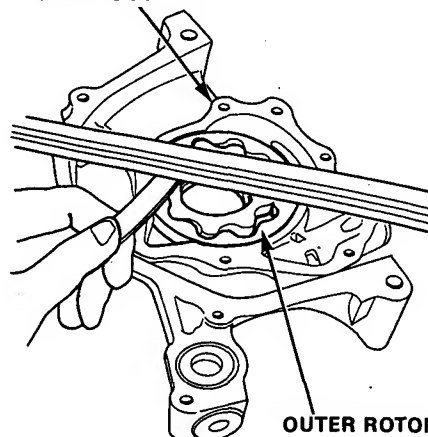


**INNER ROTOR**

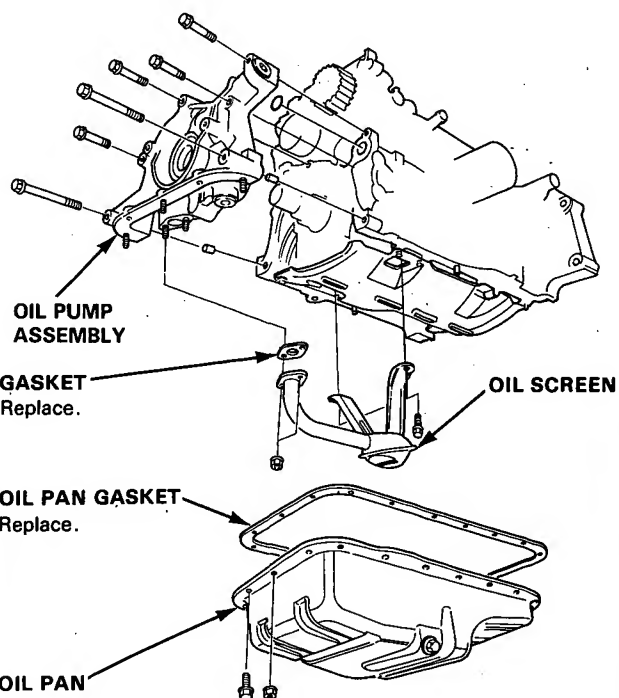
12. Check the housing-to-rotor axial clearance on the pump rotor.

**Housing-to-Rotor Axial Clearance**  
**Standard (New):** 0.02–0.07 mm  
 (0.001–0.003 in)  
**Service Limit:** 0.15 mm (0.006 in)

**PUMP HOUSING**



**OUTER ROTOR**



(cont'd)

# Oil Pump

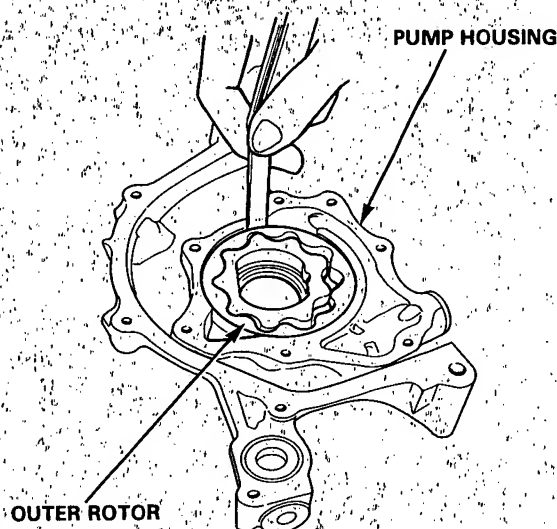
## Removal/Inspection/Installation (cont'd)

13. Check the housing-to-outer rotor radial clearance.

**Housing-to-Rotor Radial Clearance:**

**Standard (New):** 0.10–0.19 mm  
(0.004–0.007 in)

**Service Limit:** 0.20 mm (0.008 in)

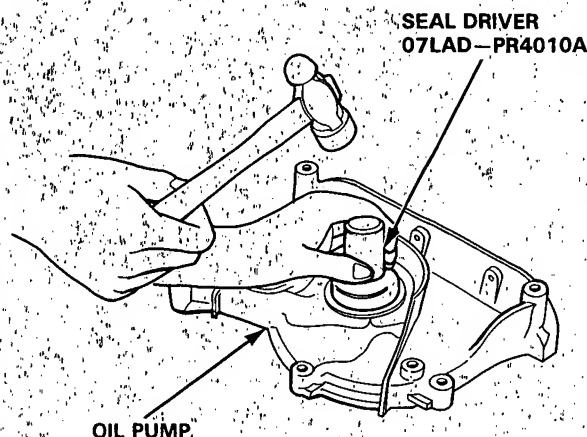


14. Inspect both rotors and pump housing for scoring or other damage. Replace parts if necessary.

15. Remove the old oil seal from the oil pump.

16. Gently tap in the new oil seal until the special tool bottoms on the pump.

**NOTE:** The oil seal alone can be replaced without removing the oil pump.



17. Reassemble the oil pump, applying locking fluid to the pump housing screws.

18. Check that the oil pump turns freely.

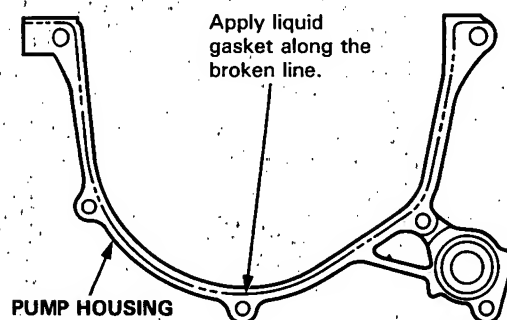
19. Apply a light coat of oil to the seal lip.

20. Install the two dowel pins and new O-ring on the oil pump.

21. Apply liquid gasket to the cylinder block mating surface of the oil pump.

### NOTE:

- Use liquid gasket, Part No. 08718-0001.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, in a narrow bead centered on the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.



- Do not install the parts if 20 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.



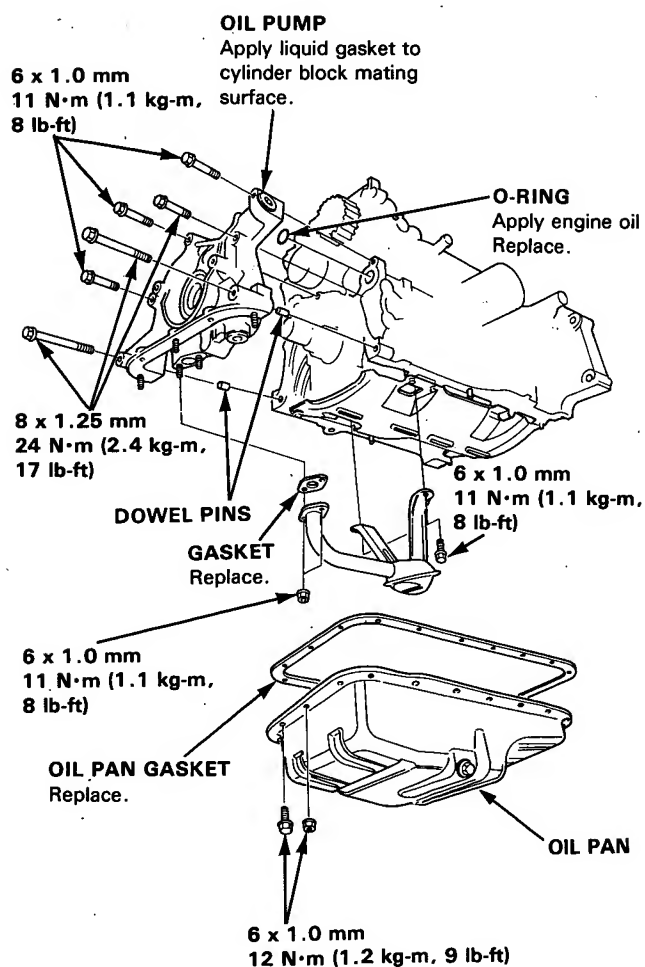


22. Install the oil pump on the cylinder block.

- Apply grease to the lip of the oil pump seal. Then, install the oil pump the inner rotor onto the crankshaft. When the pump is in place, clean any excess grease off the crankshaft and check that the oil seal lip is not distorted.

23. Install the oil screen.

24. Install the oil pan.





## **Intake Manifold/Exhaust System**

<b>Intake Manifold Replacement .....</b>	<b>9-2</b>
<b>Exhaust Manifold Replacement .....</b>	<b>9-4</b>
<b>Exhaust Pipe and Muffler Replacement .....</b>	<b>9-5</b>



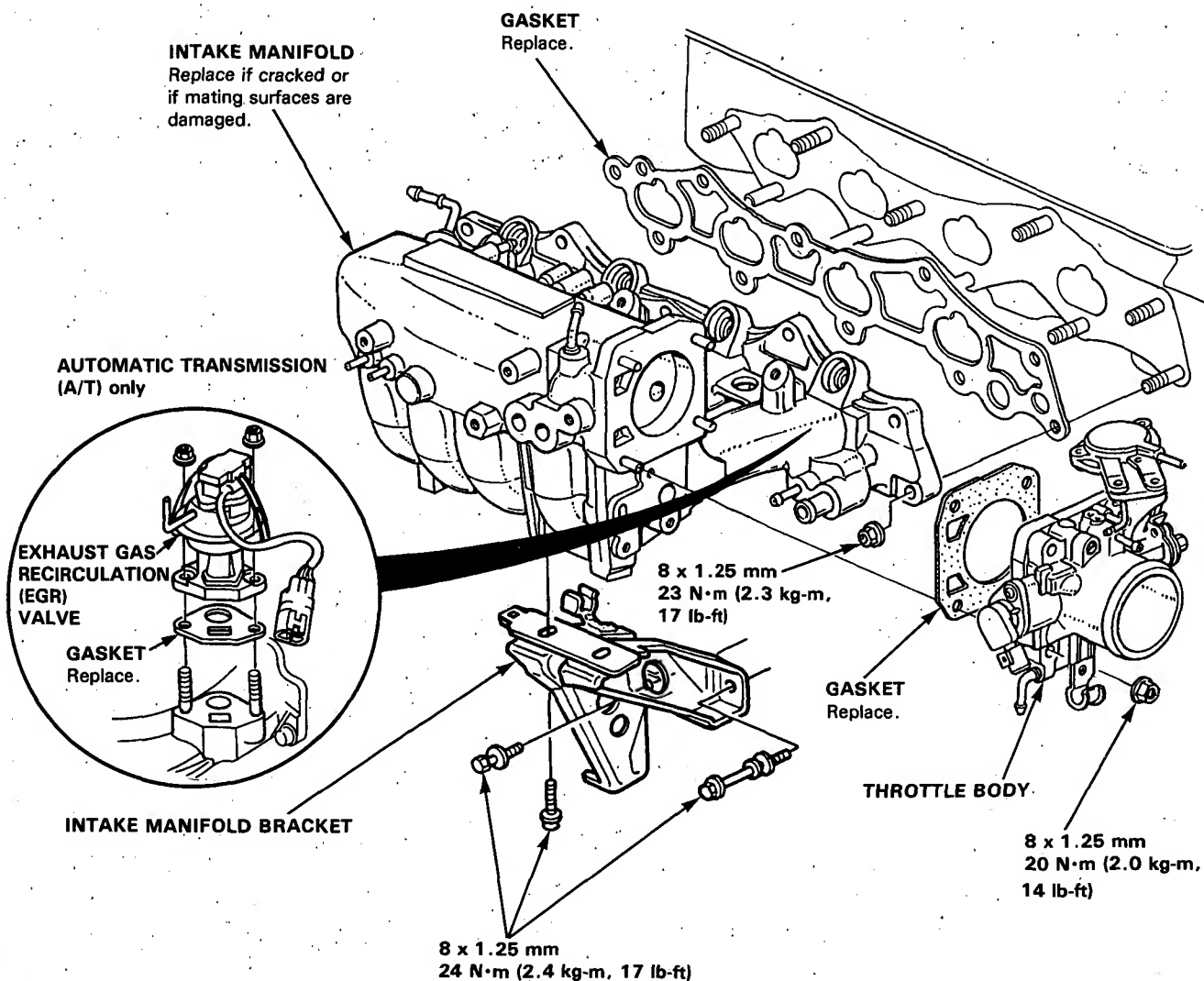
# Intake Manifold

## Replacement

NOTE: Use new O-rings and gaskets when reassembling.

CAUTION: Check for folds or scratches on the surface of the gasket. Replace with a new gasket if damaged.

B18A1 engine:

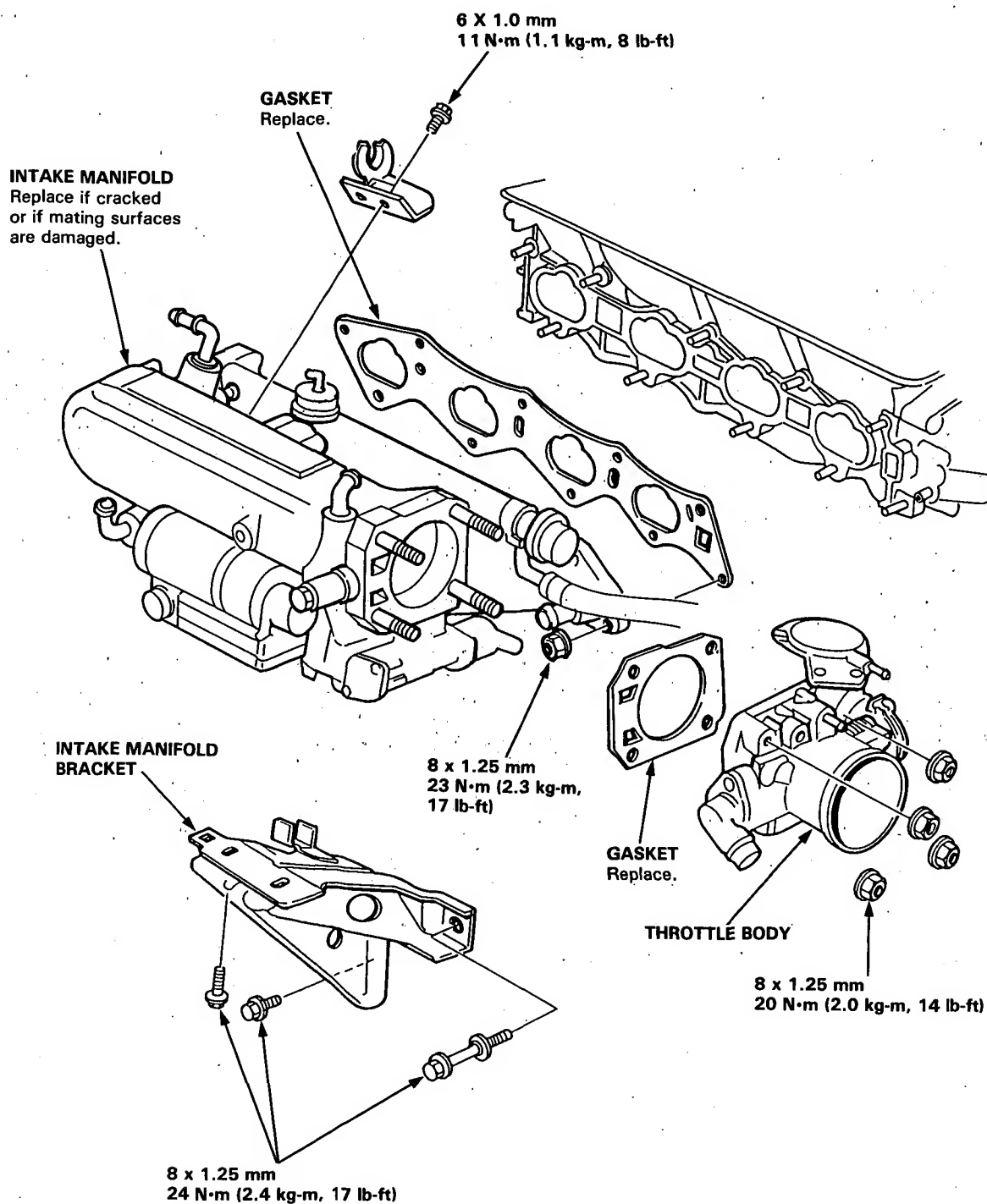




NOTE: Use new O-rings and gaskets when reassembling.

CAUTION: Check for folds or scratches on the surface of the gasket. Replace with a new gasket if damaged.

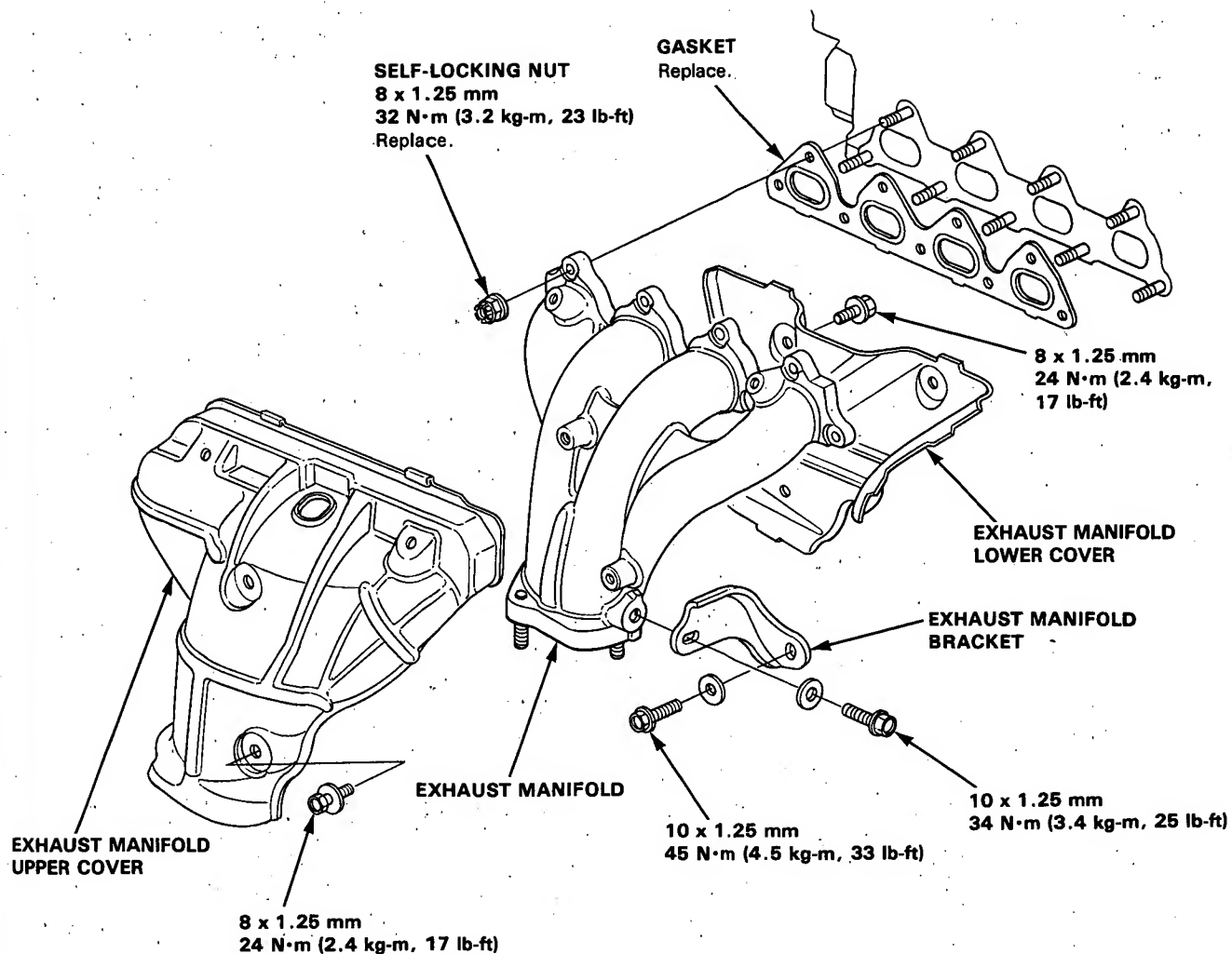
**B17A1 engine:**



# Exhaust Manifold

## Replacement

NOTE: Use new gaskets and self-locking nuts when reassembling.

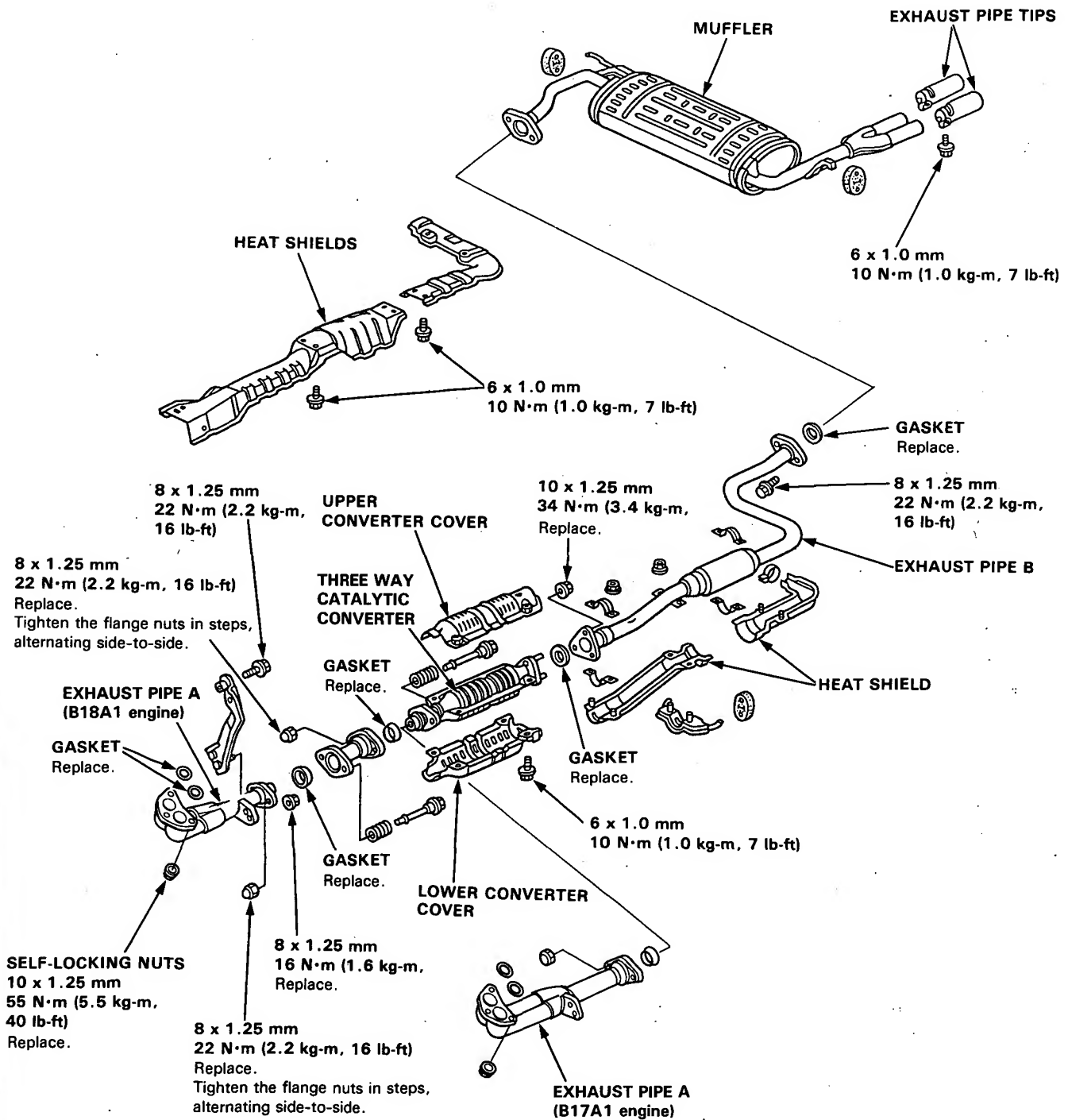


# Exhaust Pipe and Muffler



## Replacement

NOTE: Use new gaskets and self-locking nuts when reassembling.







## **Cooling**

### **Radiator**

**Replacement ..... 10-2**

**Engine Coolant Refilling  
and Bleeding ..... 10-3**

**Cap Testing ..... 10-4**

**Testing ..... 10-4**

### **Thermostat**

**Replacement ..... 10-5**

**Testing ..... 10-5**

### **Water Pump**

**Illustrated Index ..... 10-6**

**Inspection ..... 10-7**

**Replacement ..... 10-7**



# Radiator Replacement

**WARNING** System is under high pressure when engine is hot. To avoid danger of releasing scalding engine coolant, remove cap only when engine is cool.

Total Cooling System Capacity (Including heater and reservoir)

B18A1 engine:

M/T: 6.0 l (6.3 US qt, 5.3 Imp qt)

A/T: 5.8 l (6.1 US qt, 5.1 Imp qt)

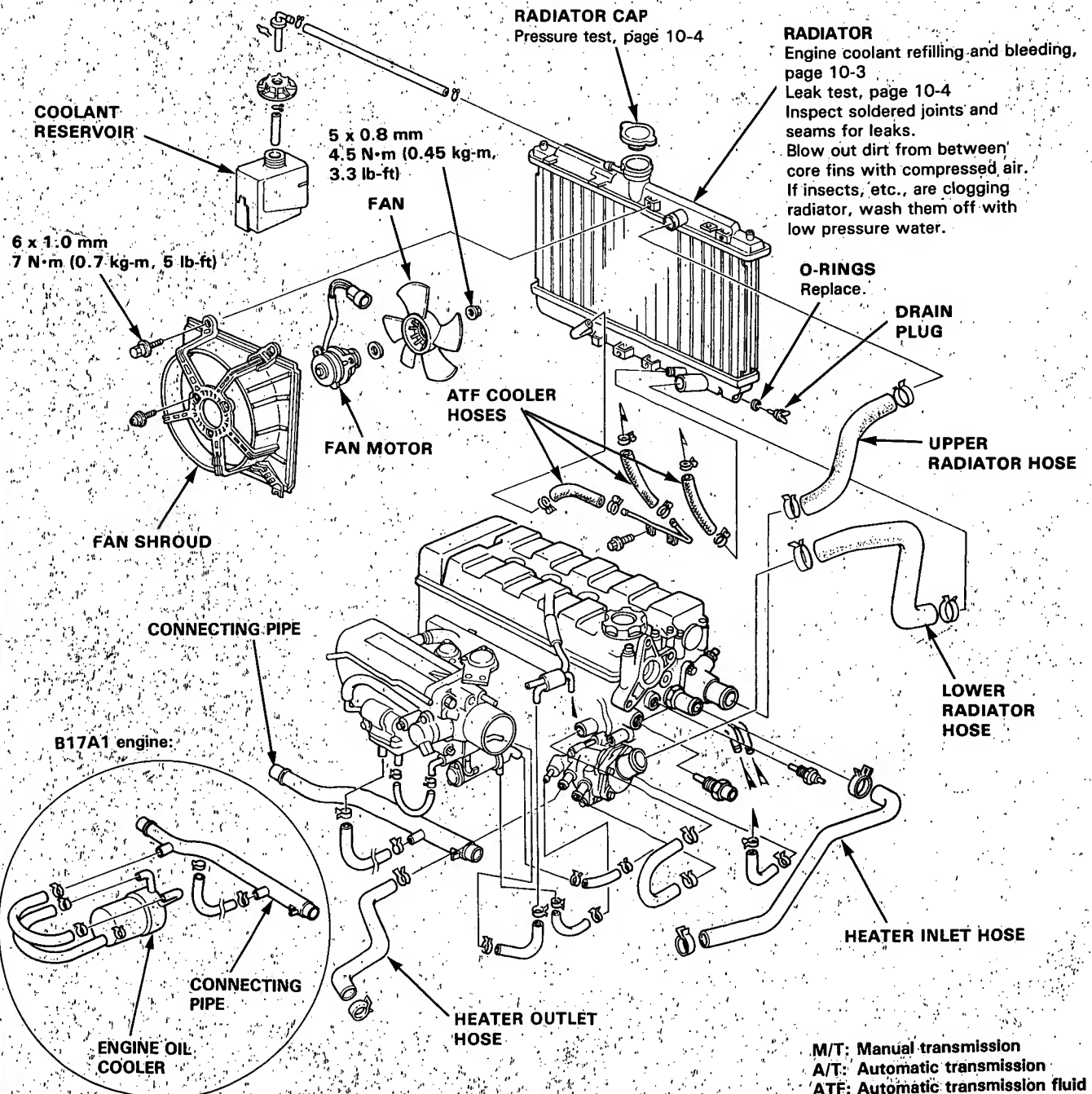
B17A1 engine:

M/T: 5.9 l (6.2 US qt, 5.2 Imp qt)

**CAUTION:** If any engine coolant spills on painted portions of the body, rinse it off immediately.

## NOTE:

- Check all cooling system hoses for damage, leaks or deterioration and replace if necessary.
- Check all hose clamps and retighten if necessary.
- Use new O-rings when reassembling.





## Engine Coolant Refilling and Bleeding

1. Set the heater temperature dial to maximum heat.
2. Remove the engine splash shield.
3. When the radiator is cool, remove the radiator cap. Loosen the drain plug, and drain the radiator.
4. Remove the drain bolt from the front side of the cylinder block to drain the block and heater.
5. Apply liquid gasket to the drain bolt threads, then reinstall the bolt with a new washer and tighten it securely.
6. Tighten the radiator drain plug securely.
7. Remove, drain and reinstall the reservoir. Fill the reservoir halfway to the MAX mark with water, then up to the MAX mark with coolant.
8. Mix the recommended anti-freeze with an equal amount of water in a clean container.

### NOTE:

- Use only ACURA-RECOMMENDED anti-freeze/coolant.
- For best corrosion protection, the engine coolant concentration must be maintained year-round at 50% MINIMUM. Coolant concentrations less than 50% may not provide sufficient protection against corrosion or freezing.
- Coolant concentrations greater than 60% will impair cooling efficiency and are not recommended.

### CAUTION:

- Do not mix different brands of anti-freeze/coolants.
- Do not use additional rust inhibitors or anti-rust products; they may not be compatible with the recommended engine coolant.

Engine Coolant Refill Capacity: including reservoir (0.6 l (0.6 US qt, 0.5 Imp qt)) and heater (0.6 l (0.6 US qt, 0.5 Imp qt)).

#### B18A1 engine:

##### Manual transmission:

5.1 l (5.4 US qt, 4.5 Imp qt)

##### Automatic transmission:

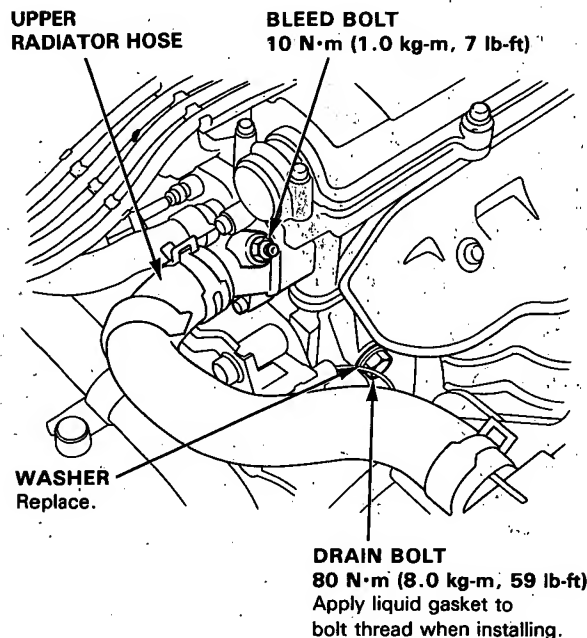
4.9 l (5.2 US qt, 4.3 Imp qt)

#### B17A1 engine:

##### Manual transmission:

5.0 l (5.3 US qt, 4.4 Imp qt)

9. Loosen the air bleed bolt in the water outlet, then fill the radiator to the bottom of the filler neck with the coolant mixture. Tighten the bleed bolt as soon as coolant starts to run out in a steady stream without bubbles.

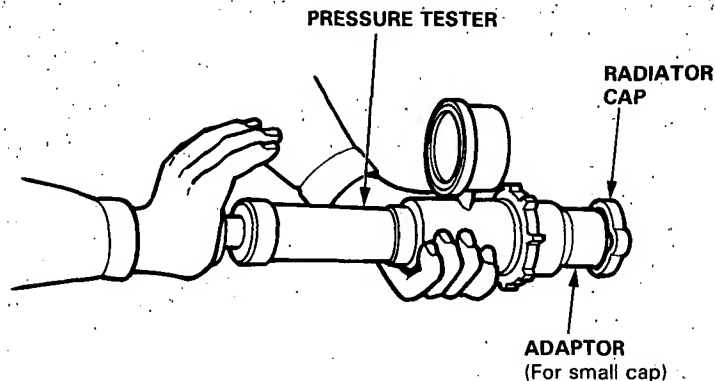


10. With the radiator cap off, start the engine and let it run until warmed up (fan goes on at least twice). Then, if necessary, add more coolant mix to bring the level back up to the bottom of the filler neck.
11. Put the radiator cap on, then run the engine again and check for leaks.

# Radiator

## Cap Testing

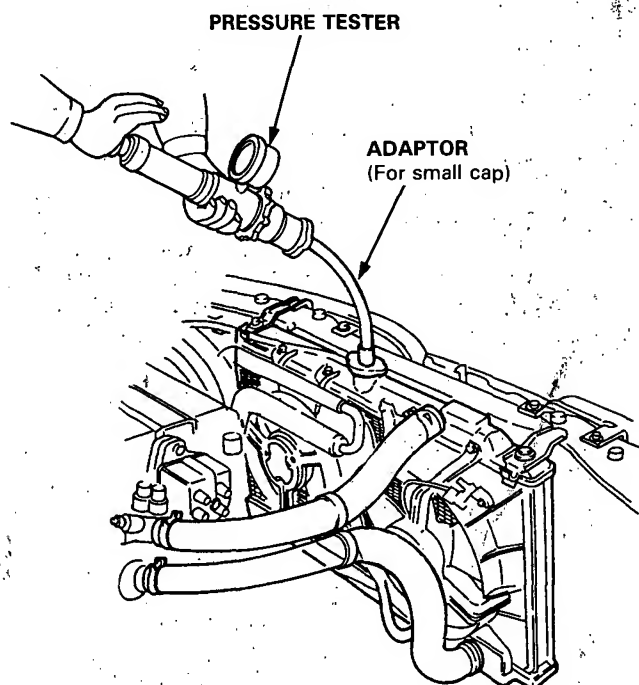
1. Remove the radiator cap; wet its seal with engine coolant, then install it on the pressure tester.
2. Apply a pressure of 75–105 kPa (0.75–1.05 kg/cm<sup>2</sup>; 11–15 psi).
3. Check for a drop in pressure.
4. If the pressure drops, replace the cap.



## Testing

1. Wait until the engine is cool, then carefully remove the radiator cap and fill the radiator with engine coolant to the top of the filler neck.
2. Attach the pressure tester to the radiator and apply a pressure of 75–105 kPa (0.75–1.05 kg/cm<sup>2</sup>; 11–15 psi).
3. Inspect for coolant leaks and a drop in pressure.
4. Remove the tester and reinstall the radiator cap.

NOTE: Check for engine oil in the coolant and/or coolant in engine oil.

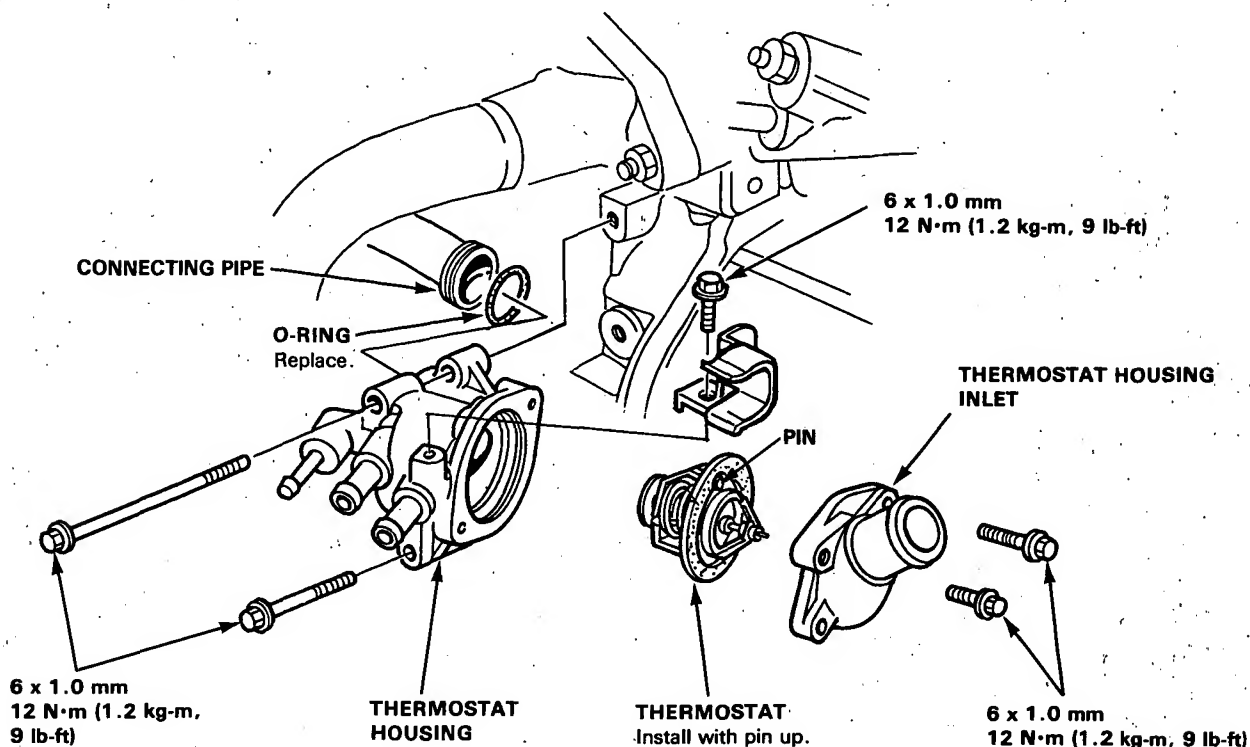


# Thermostat

## Replacement



NOTE: Use new O-rings when reassembling.



## Testing

Replace the thermostat if it is open at room temperature.

To test a closed thermostat:

1. Suspend the thermostat in a container of water as shown.
2. Heat the water and check the temperature with a thermometer. Check the temperature at which the thermostat first opens, and at which it is fully open.

**CAUTION:** Do not let the thermometer touch the bottom of hot container.

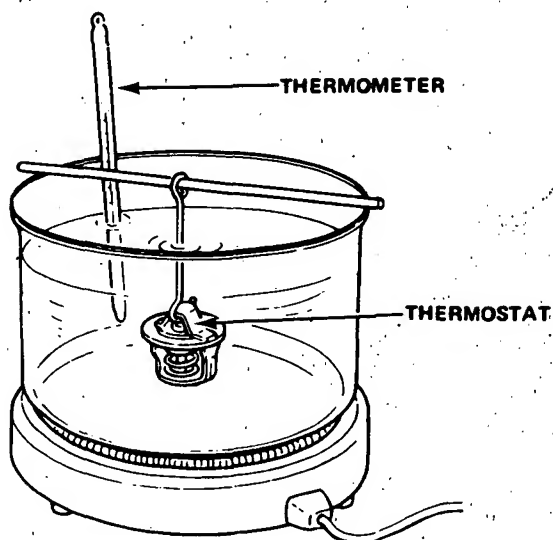
3. Measure lift height of the thermostat when fully open.

### STANDARD THERMOSTAT

Lift height: above 8.0 mm (0.31 in)

Starts opening: 169–176°F (76–80°C)

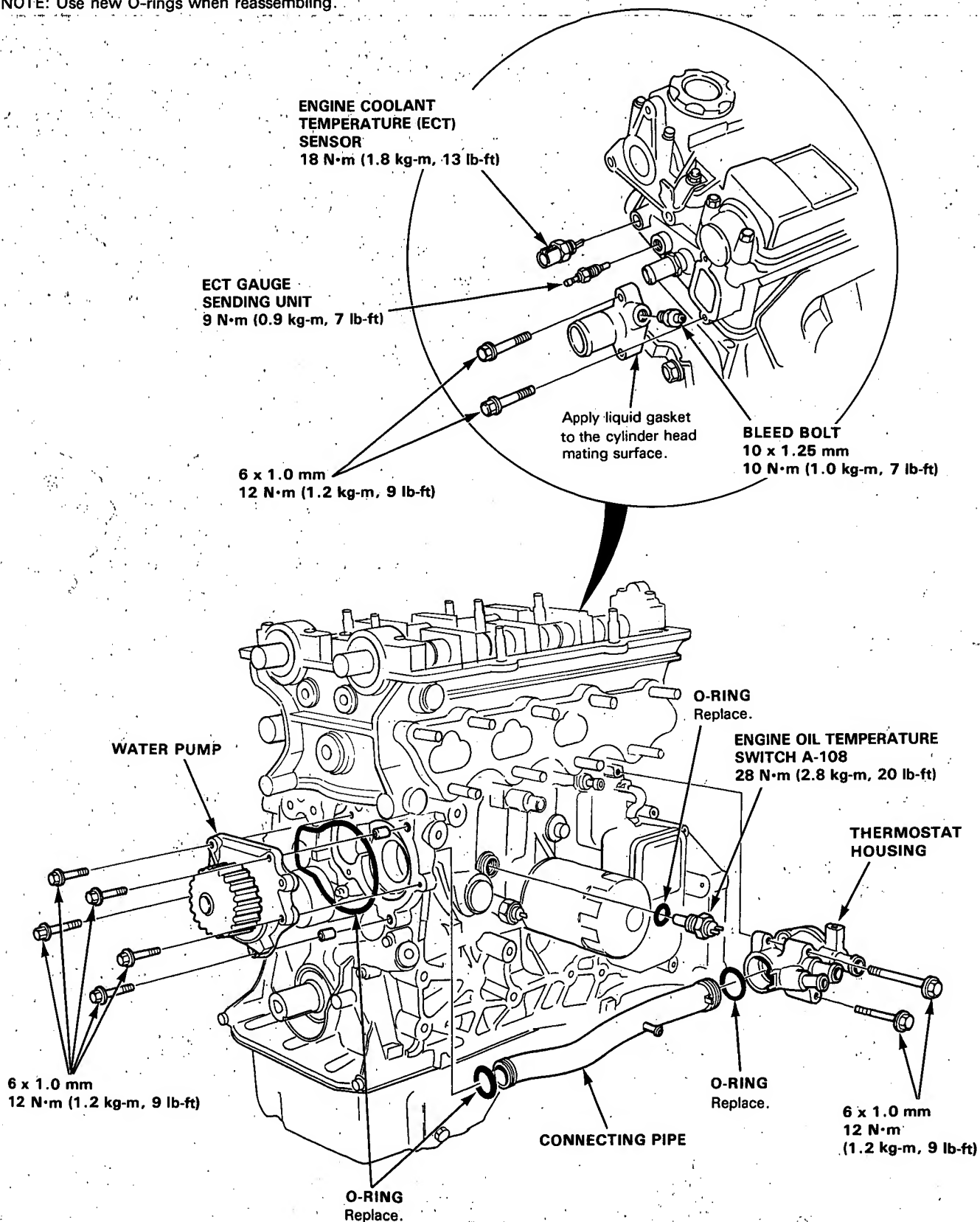
Fully open: 194°F (90°C)



# Water Pump

## Illustrated Index

NOTE: Use new O-rings when reassembling.

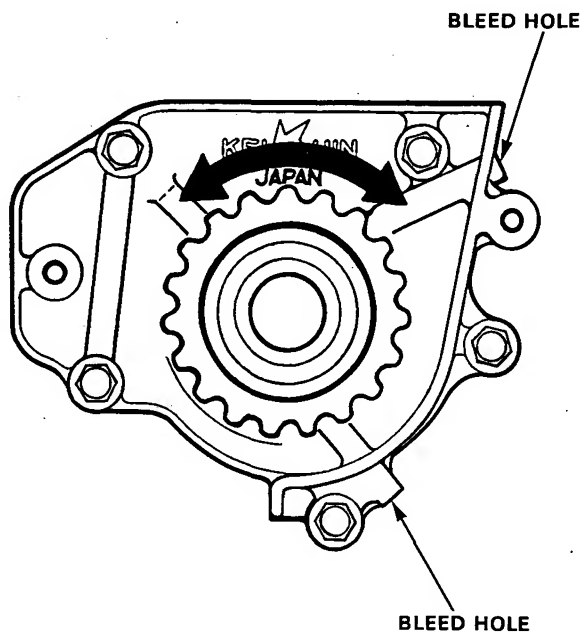




## Inspection

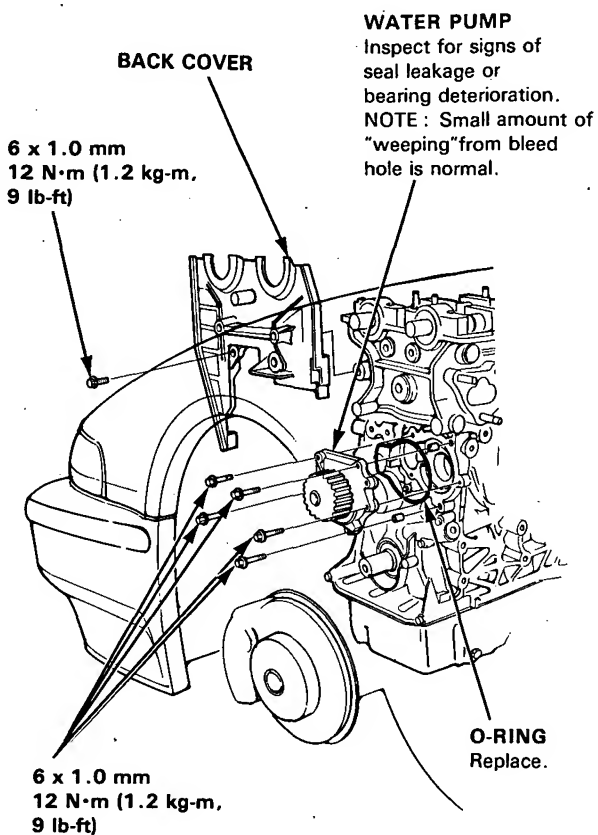
1. Remove the timing belt (B18A1 engine: page 6-24, B17A1 engine: page 6-66).
2. Check that the water pump pulley turns freely.
3. Check for signs of seal leakage.

NOTE: A small amount of "weeping" from the bleed hole is normal.



## Replacement

1. Remove the timing belt (B18A1 engine: page 6-24, B17A1 engine: page 6-66).
2. Remove the back cover.
3. Remove the water pump by removing five bolts.



4. Install the water pump in the reverse order of removal.





# Fuel and Emissions

Special Tools .....	11-2
Component Location	
Index .....	11-3
System Description	
Vacuum Connections .....	11-6
Electrical Connections .....	11-12
System Connectors .....	11-20
Troubleshooting	
Troubleshooting Guide .....	11-38
Self-diagnostic Procedures .....	11-40
How to Read Flowcharts .....	11-45
PGM-FI System	
System Description .....	11-46
Troubleshooting Flowcharts	
Engine Will Not Start .....	11-48
Engine Control Module .....	11-49
Heated Oxygen Sensor .....	11-54
Heated Oxygen Sensor Heater .....	11-56
Fuel Supply System .....	11-60
Manifold Absolute Pressure	
Sensor .....	11-62
Top Dead Center/Crankshaft Posi-	
tion/Cylinder Position sensor .....	11-68
Engine Coolant Temperature Sensor .....	11-70
Throttle Position Sensor .....	11-72
Intake Air Temperature Sensor .....	11-74
Barometric Pressure Sensor .....	11-76
Ignition Output Signal .....	11-78
Vehicle Speed Sensor .....	11-80
Knock Sensor [B17A1 engine] .....	11-82
Idle Control System	
System Troubleshooting Guide .....	11-84
System Description .....	11-85
Troubleshooting Flowcharts	
Idle Air Control Valve .....	11-88
Air Conditioning Signal .....	11-90
Alternator FR Signal .....	11-92
Automatic Transaxle (A/T) Gear	
Position Signal .....	11-94
Starter Switch Signal .....	11-96
Brake Switch Signal .....	11-98
Power Steering Pressure Switch Signal ...	11-100
Fast Idle Thermo Valve .....	11-101
Starting Air Valve [B18A1 engine: A/T] .....	11-102
Idle Speed Setting .....	11-103

## Fuel Supply System

System Troubleshooting Guide .....	11-105
System Description .....	11-106
Fuel Pressure .....	11-106
Fuel Injectors .....	11-108
Fuel Pressure Regulator .....	11-112
Fuel Filter .....	11-116
Fuel Pump .....	11-117
PGM-FI Main Relay .....	11-119
Fuel Tank .....	11-122

## Intake Air System

System Troubleshooting Guide .....	11-123
System Description .....	11-124
Air Cleaner .....	11-125
Throttle Cable .....	11-126
Throttle Body .....	11-127
Throttle Valve Dashpot System .....	11-130

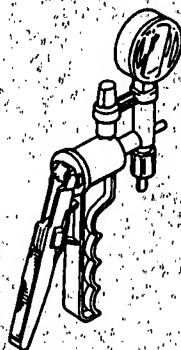
## Emission Control System

System Troubleshooting Guide .....	11-132
System Description .....	11-133
Tailpipe Emission .....	11-133
Three Way Catalytic Converter .....	11-134
Exhaust Gas Recirculation System	
[B18A1 engine: A/T] .....	11-136
Positive Crankcase Ventilation System .....	11-142
Evaporative Emission Control .....	11-143

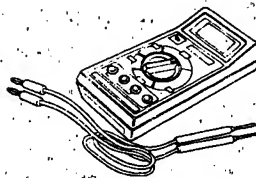


# Special Tools

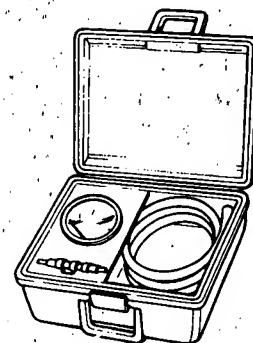
Ref. No.	Tool Number	Description	Qty	Page Reference
①	A973X-041-XXXXX	Vacuum Pump/Gauge	1	11-66, 102, 114, 127, 131, 137, 145
②	KS-AHM-32-003	Digital Multimeter	1	11-43, 56, 61
③	07JAZ-001000A	Vacuum/Pressure Gauge 0-4 in. Hg	1	11-147, 148
④	07LAJ-PT3010A	Test Harness	1	11-43
⑤	07406-0040001	Fuel Pressure Gauge	1	11-107, 112



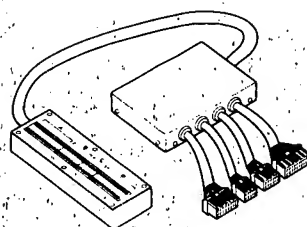
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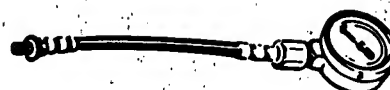
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③



④



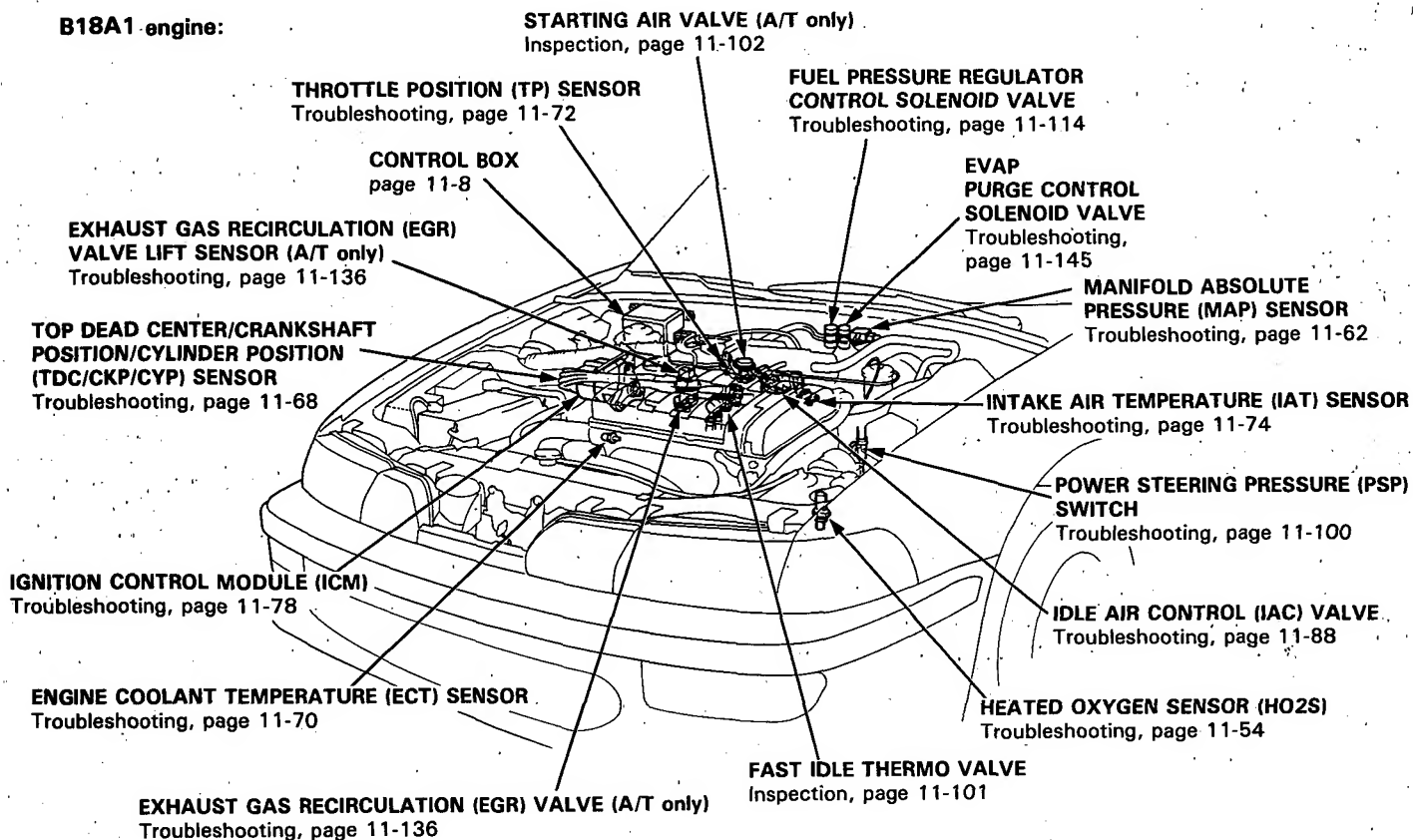
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# Component Locations

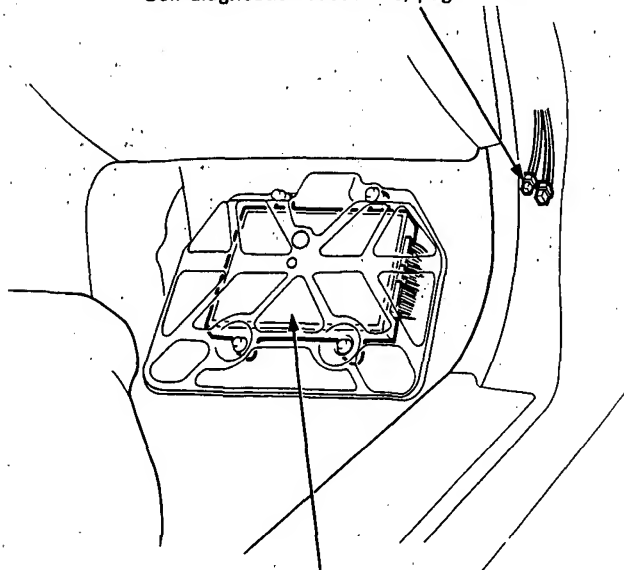


## Index

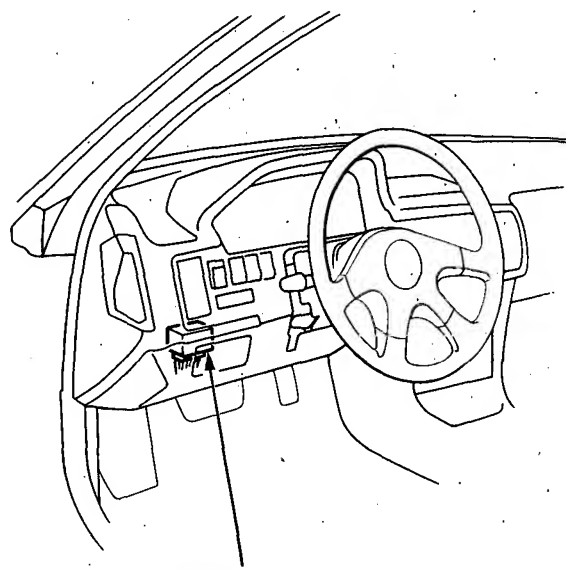
**B18A1 engine:**



**SERVICE CHECK CONNECTOR (2P)**  
Self-diagnostic Procedures, page 11-40



**ENGINE CONTROL MODULE (ECM)**  
Self-diagnostic Procedures, page 11-40  
Troubleshooting, page 11-48

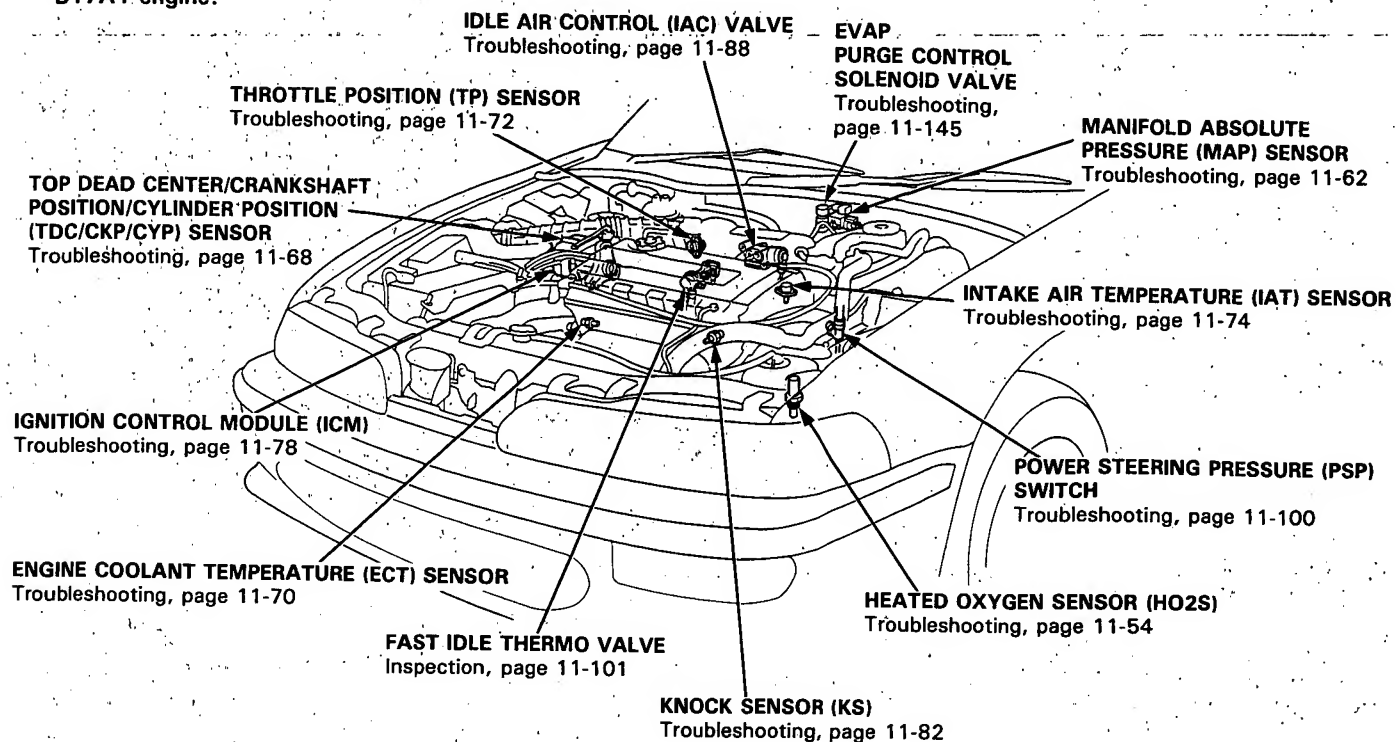


**PGM-FI  
MAIN RELAY**  
Relay Testing, page 11-119  
Troubleshooting, page 11-120

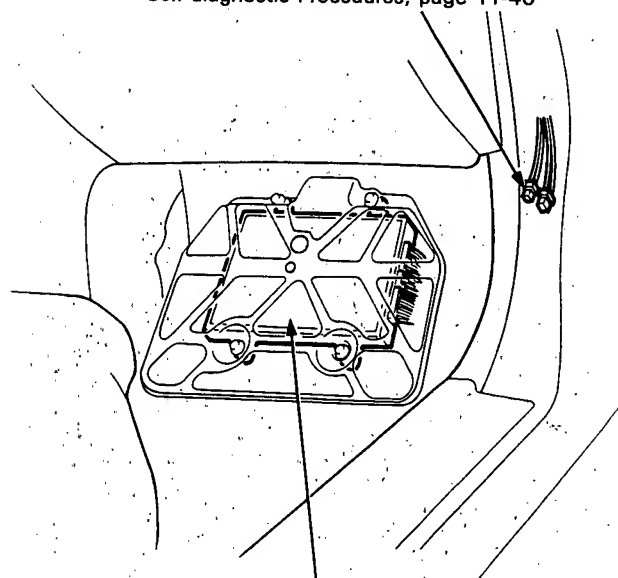
# Component Locations

## Index

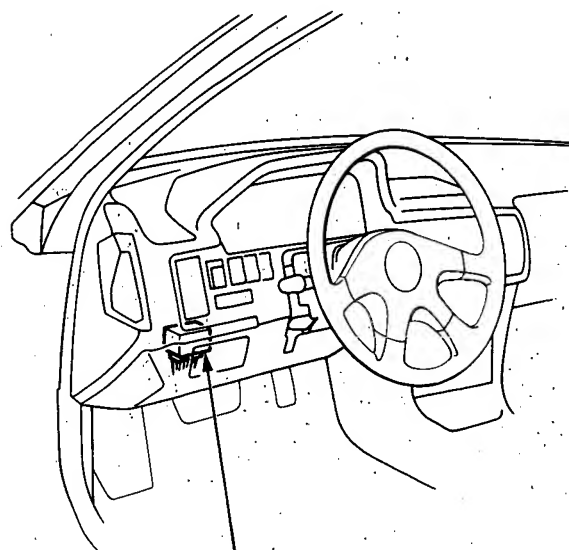
B17A1 engine:



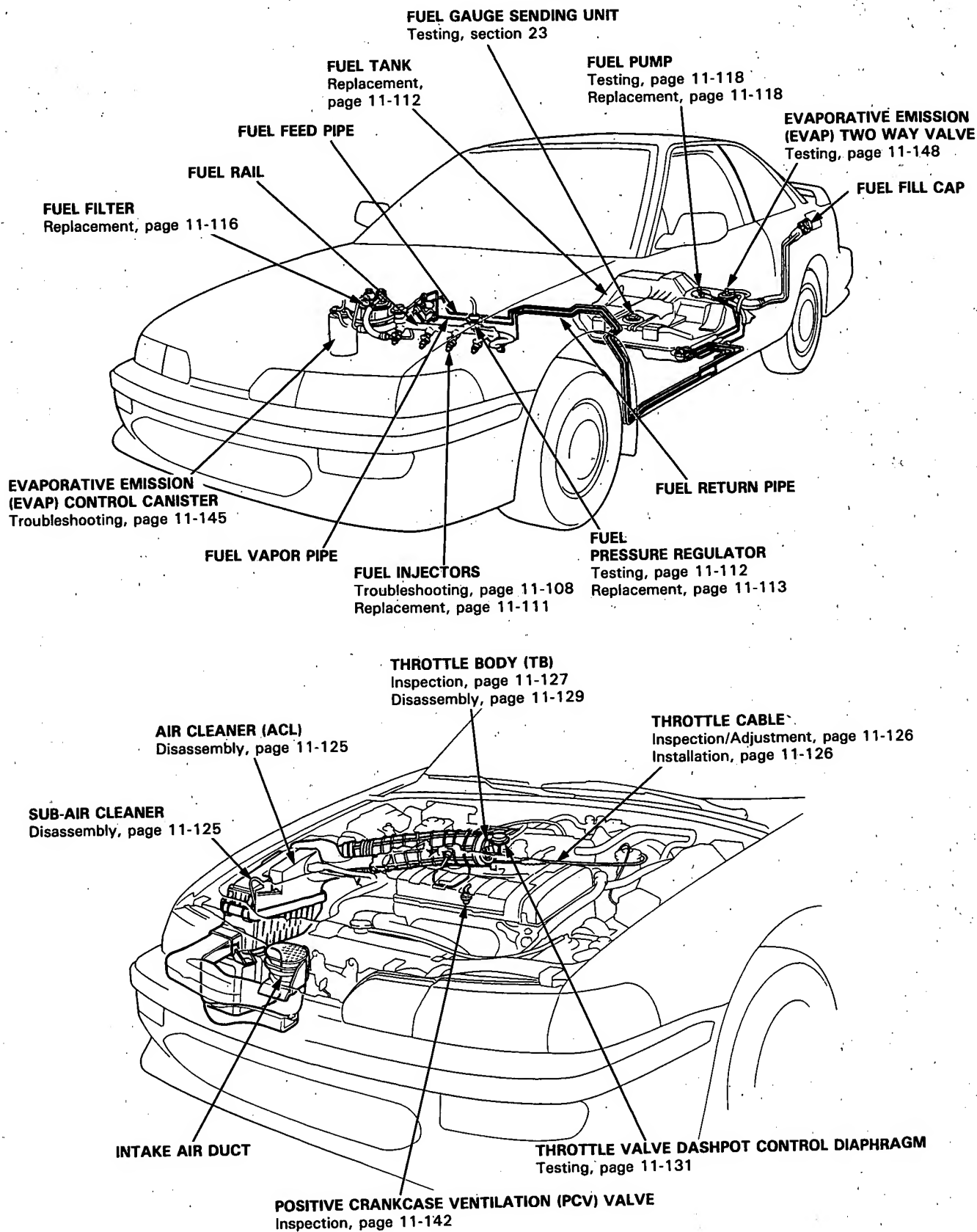
**SERVICE CHECK CONNECTOR (2P)**  
Self-diagnostic Procedures, page 11-40



**ENGINE CONTROL MODULE (ECM)**  
Self-diagnostic Procedures, page 11-40  
Troubleshooting, page 11-48



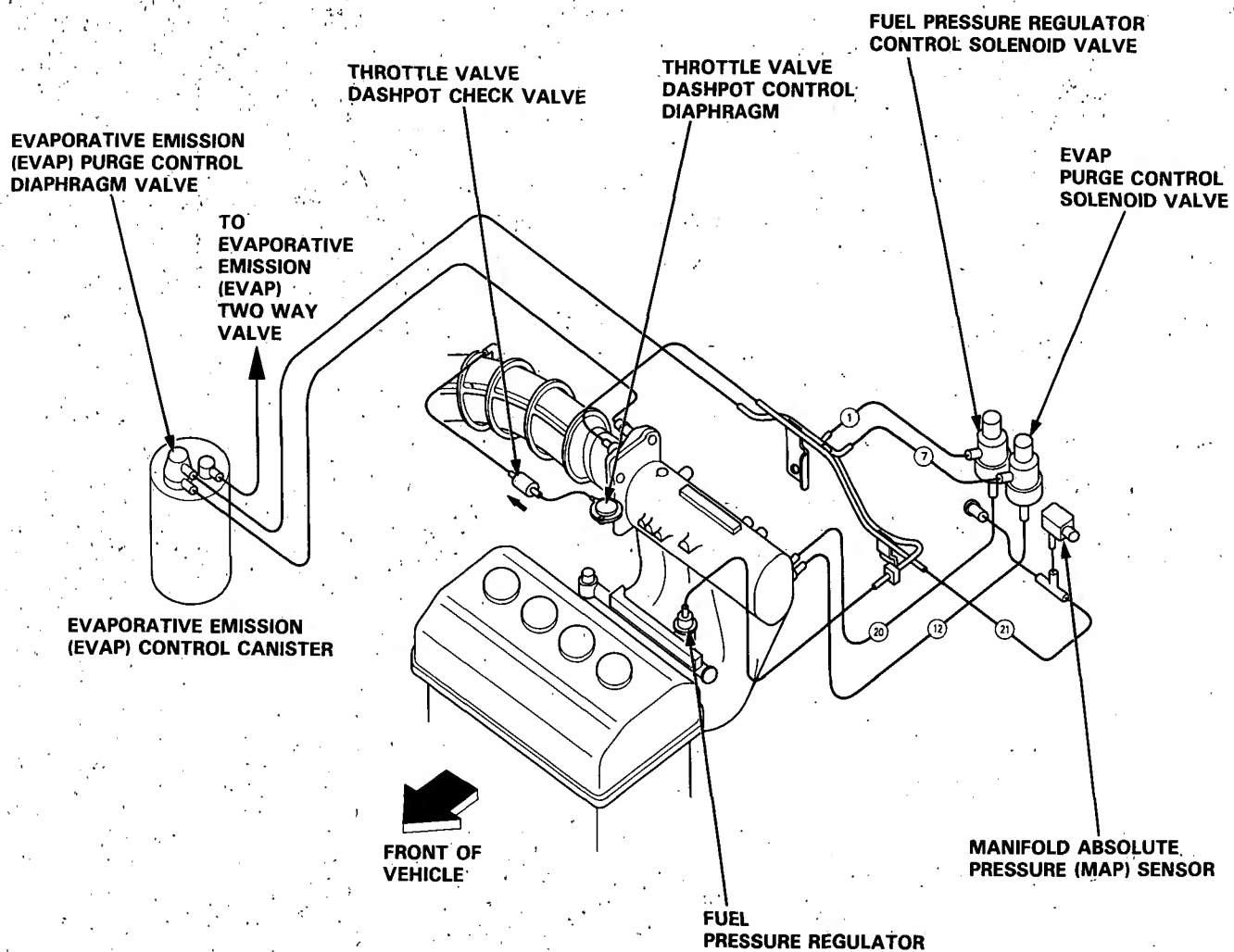
**PGM-FI MAIN RELAY**  
Relay Testing, page 11-119  
Troubleshooting, page 11-120



# System Description

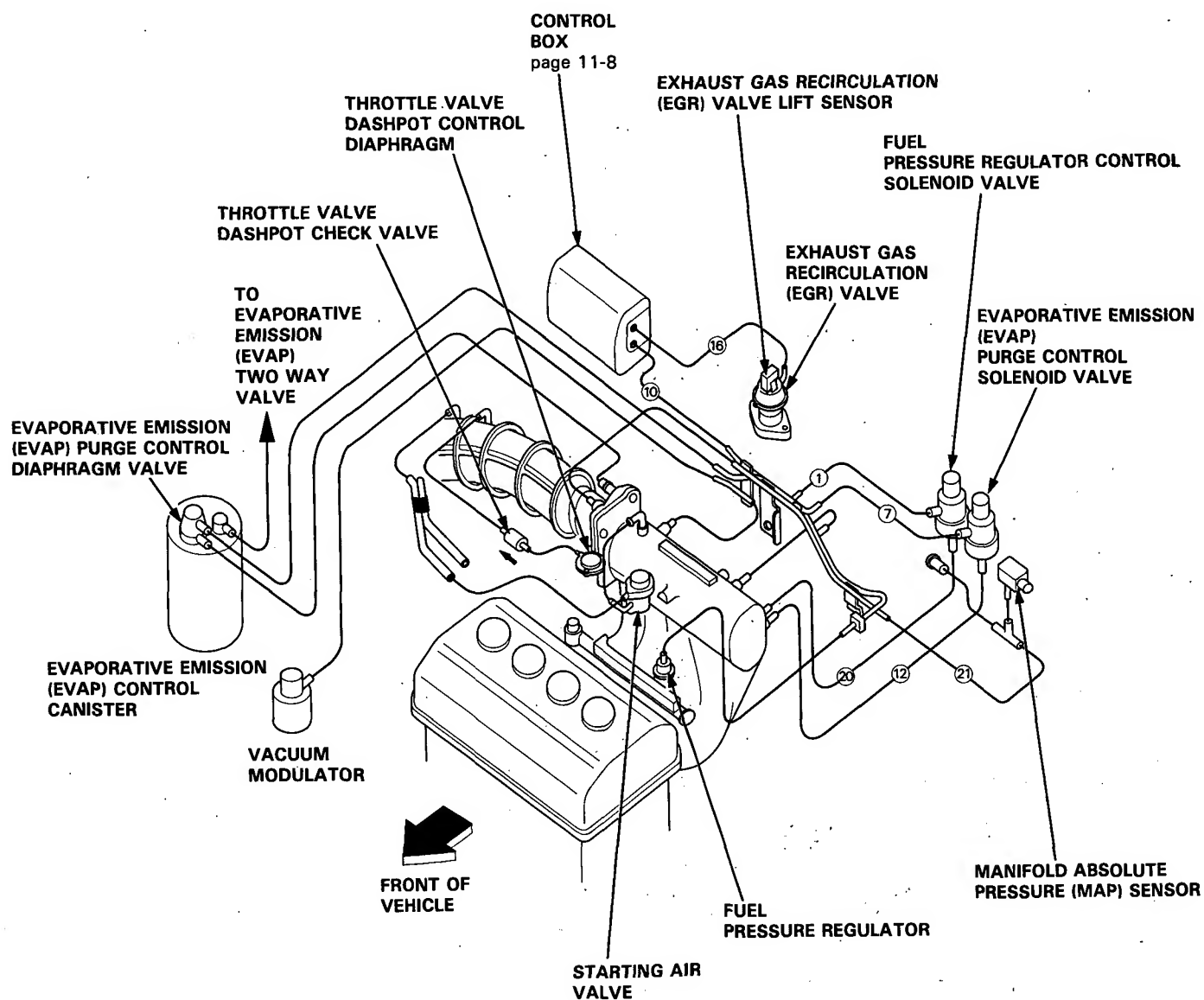
## Vacuum Connections

B18A1 engine (M/T):





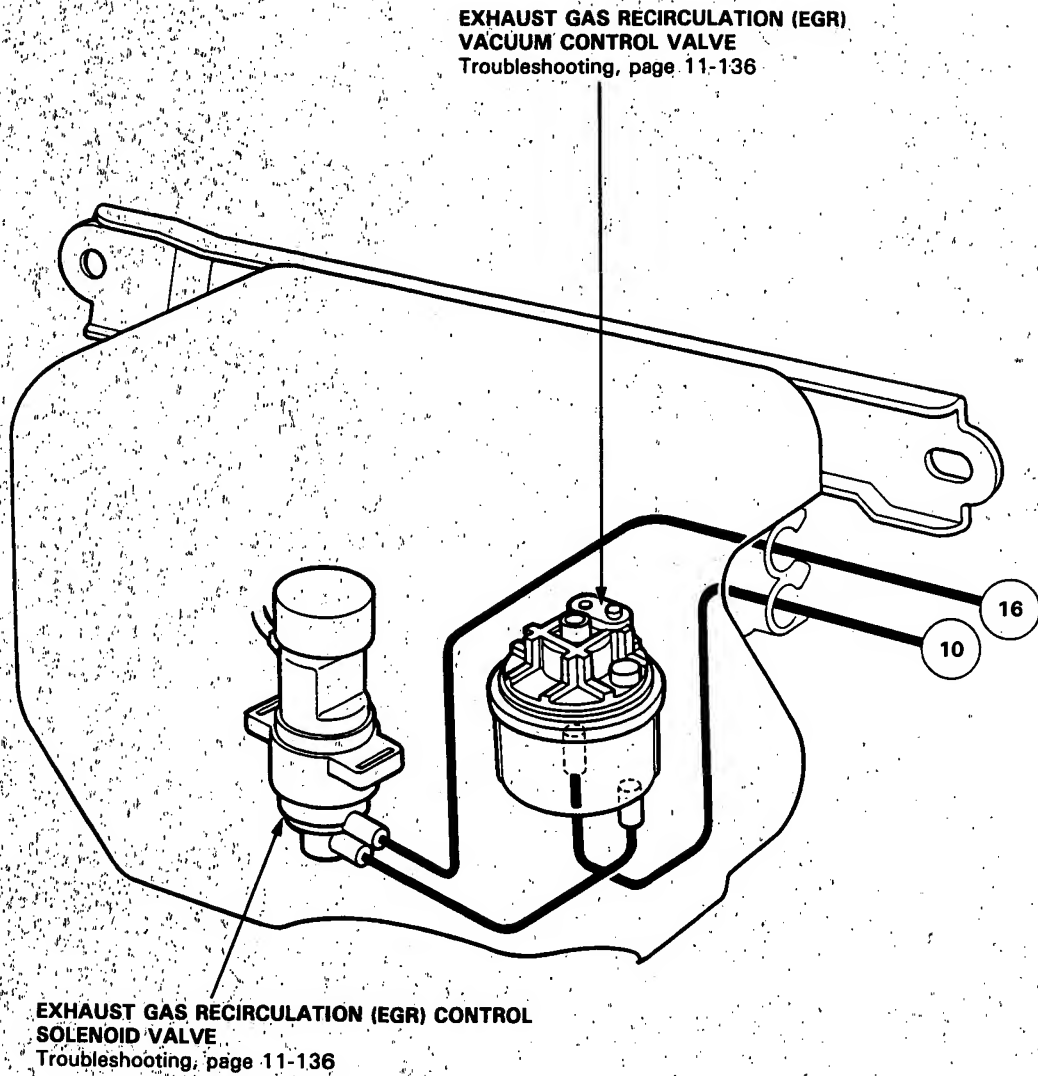
**B18A1 engine (A/T):**



# System Description

## Vacuum Connections

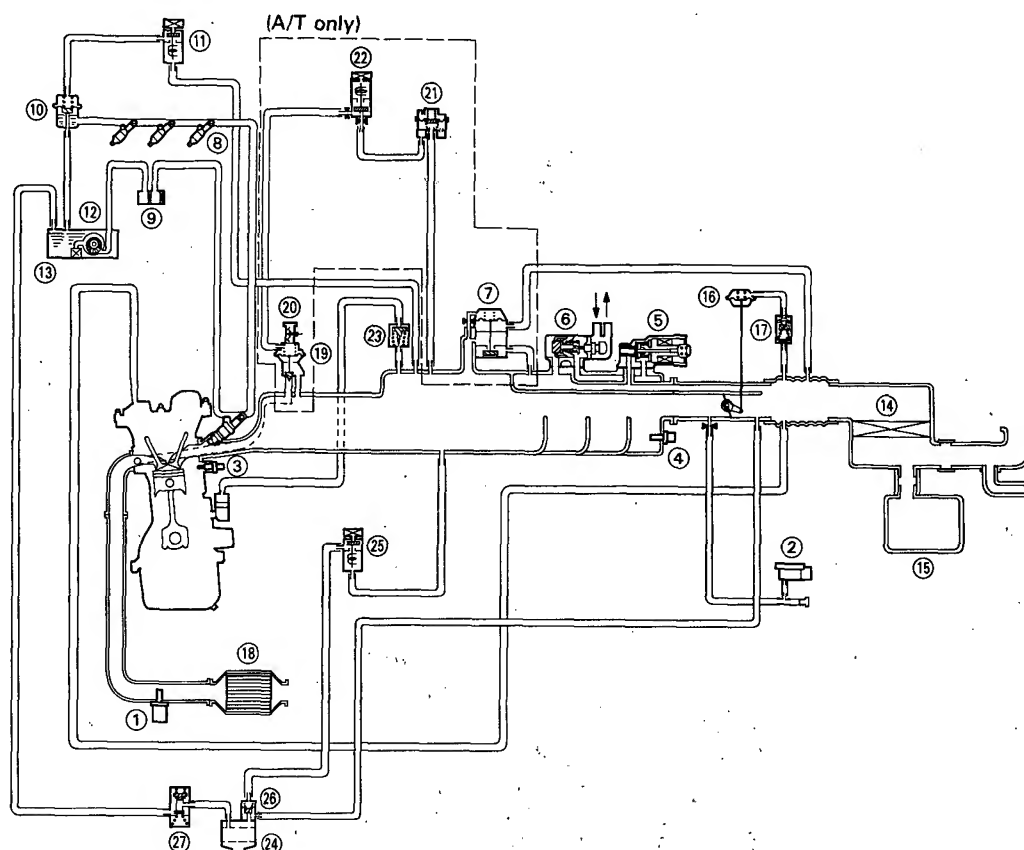
B18A1 engine (A/T):  
Control Box







**B18A1 engine:**



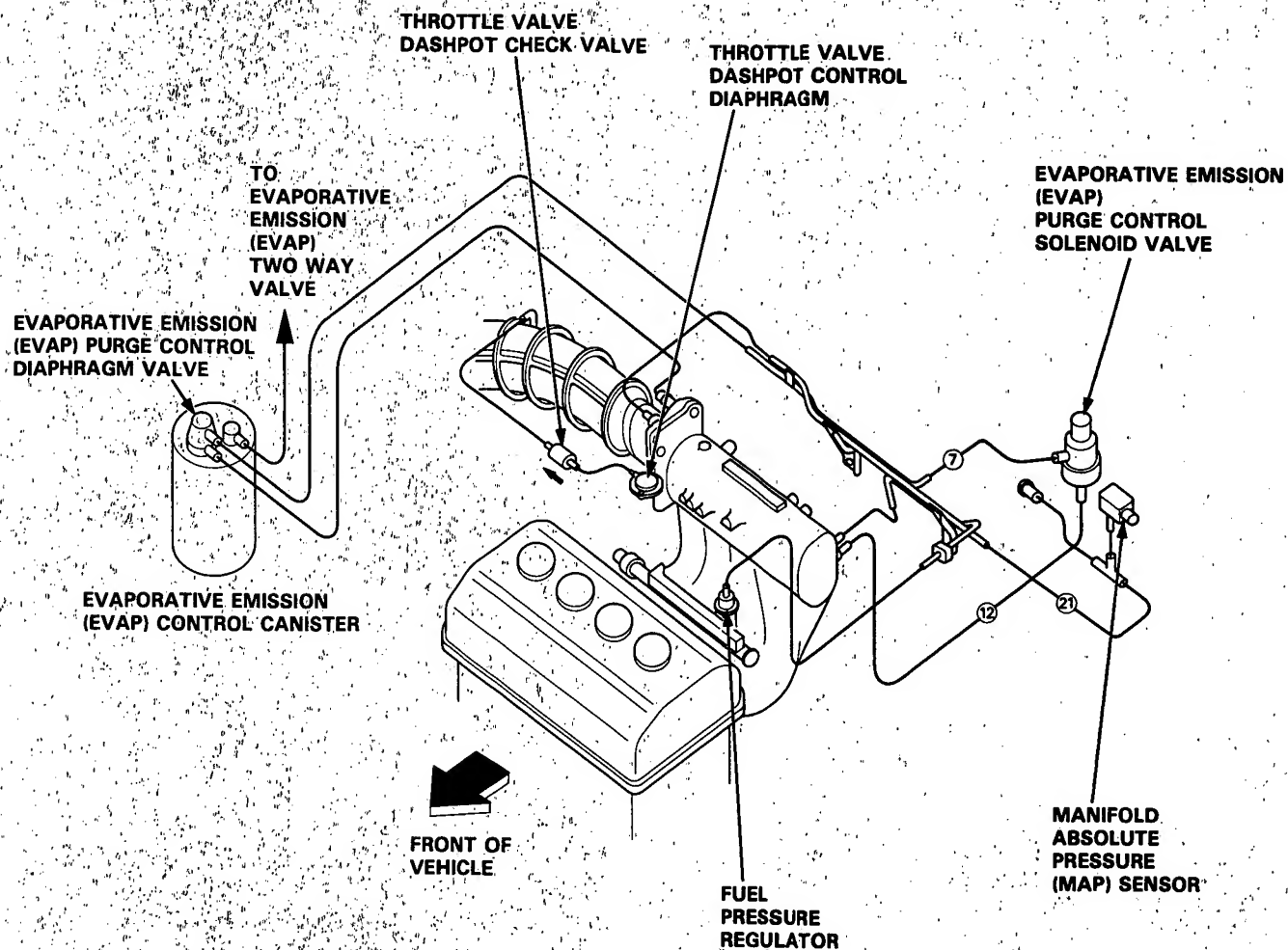
- ① HEATED OXYGEN SENSOR (HO2S)
- ② MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ③ ENGINE COOLANT TEMPERATURE (ECT) SENSOR
- ④ INTAKE AIR TEMPERATURE (IAT) SENSOR
- ⑤ IDLE AIR CONTROL (IAC) VALVE
- ⑥ FAST IDLE THERMO VALVE
- ⑦ STARTING AIR VALVE (A/T ONLY)
- ⑧ FUEL INJECTOR
- ⑨ FUEL FILTER
- ⑩ FUEL PRESSURE REGULATOR
- ⑪ FUEL PRESSURE REGULATOR CONTROL SOLENOID VALVE
- ⑫ FUEL PUMP
- ⑬ FUEL TANK
- ⑭ AIR CLEANER
- ⑮ RESONATOR
- ⑯ THROTTLE VALVE DASHPOT CONTROL DIAPHRAGM

- ⑰ THROTTLE VALVE DASHPOT CHECK VALVE
- ⑱ THREE WAY CATALYTIC CONVERTER (TWC)
- ⑲ EXHAUST GAS RECIRCULATION (EGR) VALVE (A/T ONLY)
- ⑳ EXHAUST GAS RECIRCULATION (EGR) VALVE LIFT SENSOR (A/T ONLY)
- ㉑ EXHAUST GAS RECIRCULATION (EGR) VACUUM CONTROL VALVE (A/T ONLY)
- ㉒ EXHAUST GAS RECIRCULATION (EGR) CONTROL SOLENOID VALVE (A/T ONLY)
- ㉓ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
- ㉔ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
- ㉕ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL SOLENOID VALVE
- ㉖ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL DIAPHRAGM VALVE
- ㉗ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE

# System Description

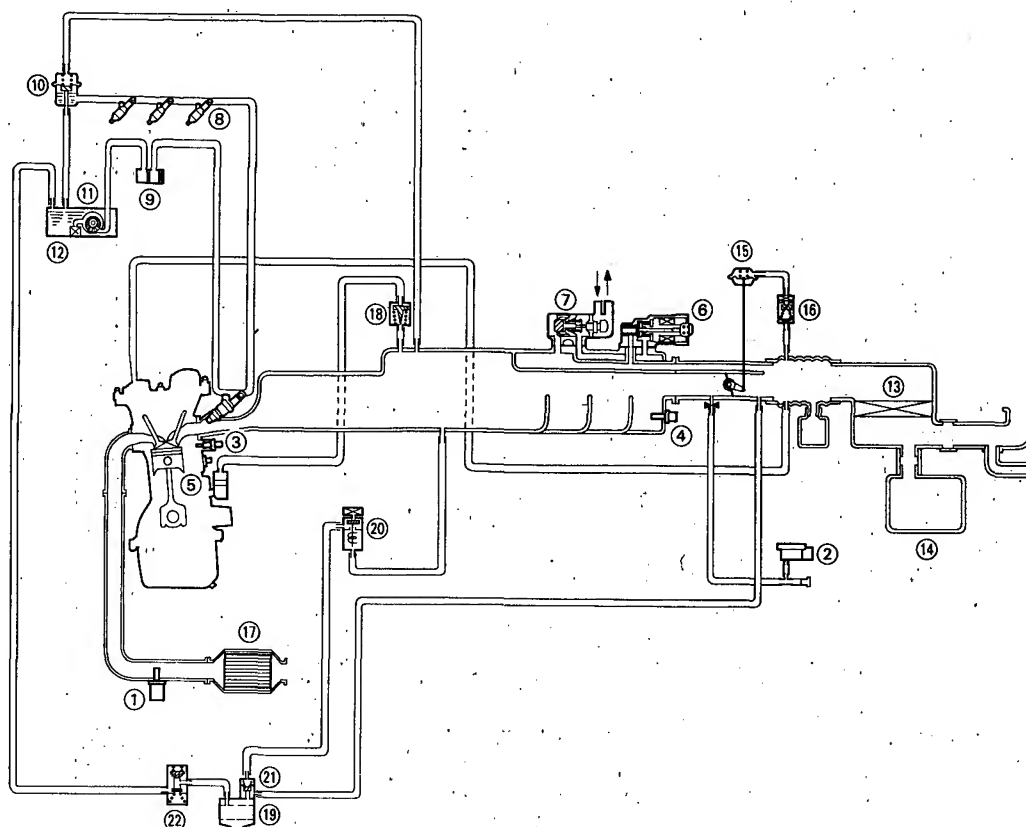
## Vacuum Connections

B17A1 engine:





**B17A1 engine:**

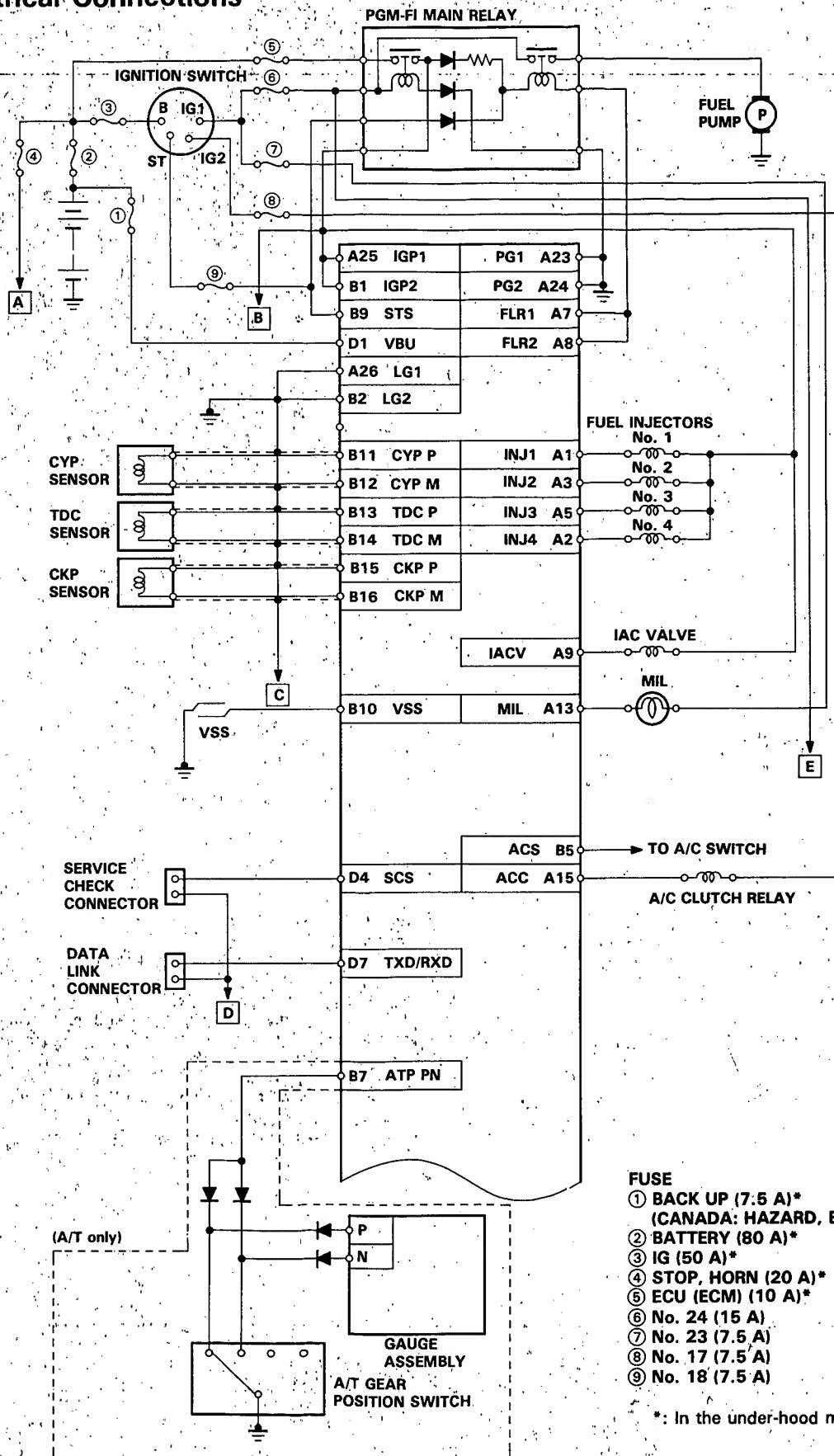


- ① HEATED OXYGEN SENSOR (HO2S)
- ② MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ③ ENGINE COOLANT TEMPERATURE (ECT) SENSOR
- ④ INTAKE AIR TEMPERATURE (IAT) SENSOR
- ⑤ KNOCK SENSOR (KS)
- ⑥ IDLE AIR CONTROL (IAC) VALVE
- ⑦ FAST IDLE THERMO VALVE
- ⑧ FUEL INJECTOR
- ⑨ FUEL FILTER
- ⑩ FUEL PRESSURE REGULATOR
- ⑪ FUEL PUMP
- ⑫ FUEL TANK

- ⑬ AIR CLEANER
- ⑭ RESONATOR
- ⑮ THROTTLE VALVE DASHPOT CONTROL DIAPHRAGM
- ⑯ THROTTLE VALVE DASHPOT CHECK VALVE
- ⑰ THREE WAY CATALYTIC CONVERTER (TWC)
- ⑱ POSITIVE CRANKCASE VENTILATION (PCV) VALVE
- ⑲ EVAPORATIVE EMISSION (EVAP) CONTROL CANISTER
- ⑳ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL SOLENOID VALVE
- ㉑ EVAPORATIVE EMISSION (EVAP) PURGE CONTROL DIAPHRAGM VALVE
- ㉒ EVAPORATIVE EMISSION (EVAP) TWO WAY VALVE

# System Description

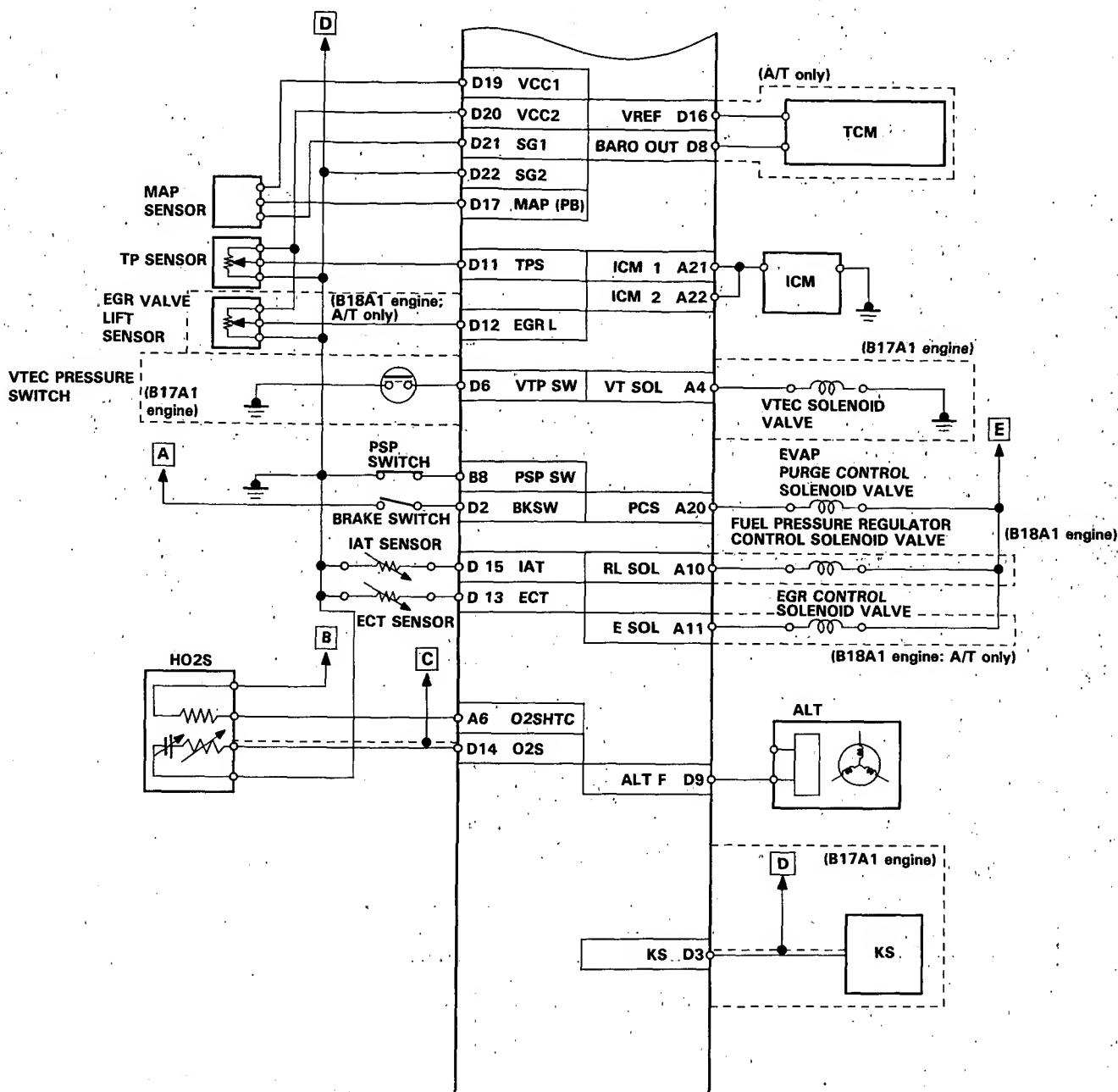
## Electrical Connections



### FUSE

- ① BACK UP (7.5 A)\*  
(CANADA: HAZARD, BACK UP, 10 A)\*
- ② BATTERY (80 A)\*
- ③ IG (50 A)\*
- ④ STOP, HORN (20 A)\*
- ⑤ ECU (ECM) (10 A)\*
- ⑥ No. 24 (15 A)
- ⑦ No. 23 (7.5 A)
- ⑧ No. 17 (7.5 A)
- ⑨ No. 18 (7.5 A)

\*: In the under-hood main fuse box



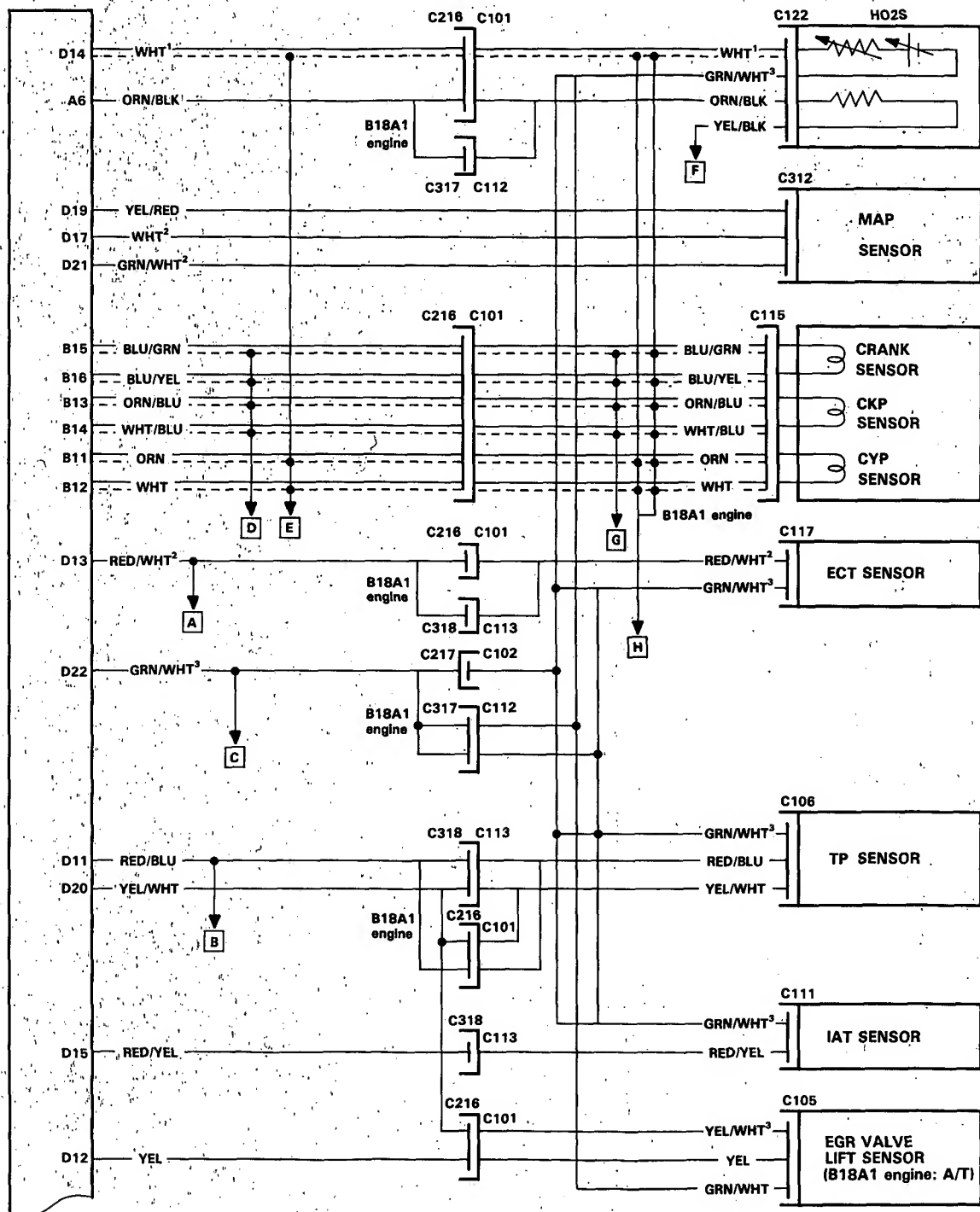
PERIPHERAL LOCATIONS

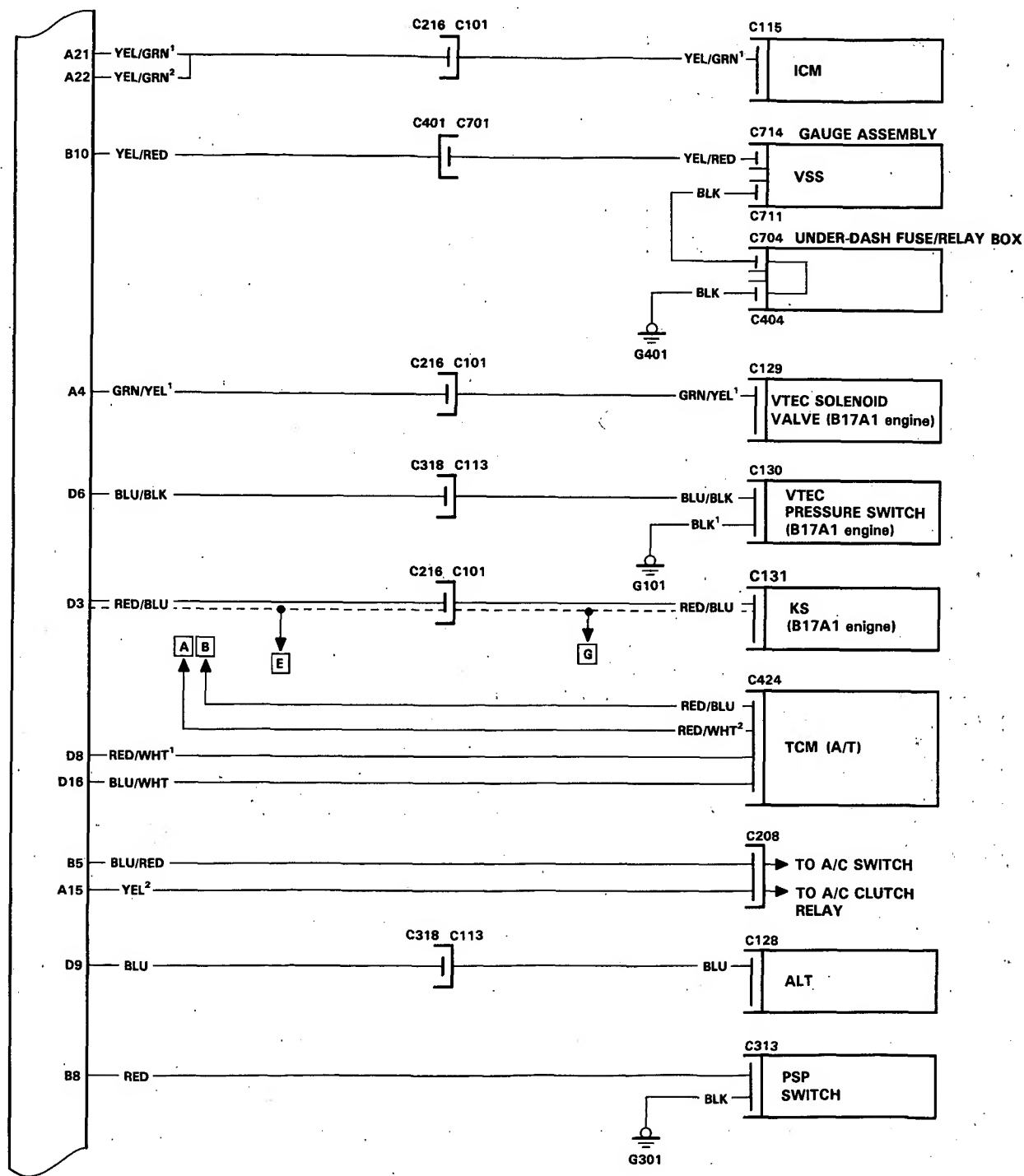
A1 A3 A5 A7 A9 A11 A13 A15 A17 A19 A21 A23 A25	B1 B3 B5 B7 B9 B11 B13 B15	D1 D3 D5 D7 D9 D11 D13 D15 D17 D19 D21
<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
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A2 A4 A6 A8 A10 A12 A14 A16 A18 A20 A22 A24 A26	B2 B4 B6 B8 B10 B12 B14 B16	D2 D4 D6 D8 D10 D12 D14 D16 D18 D20 D22

**11-13**

# System Description

## Electrical Connections (cont'd)

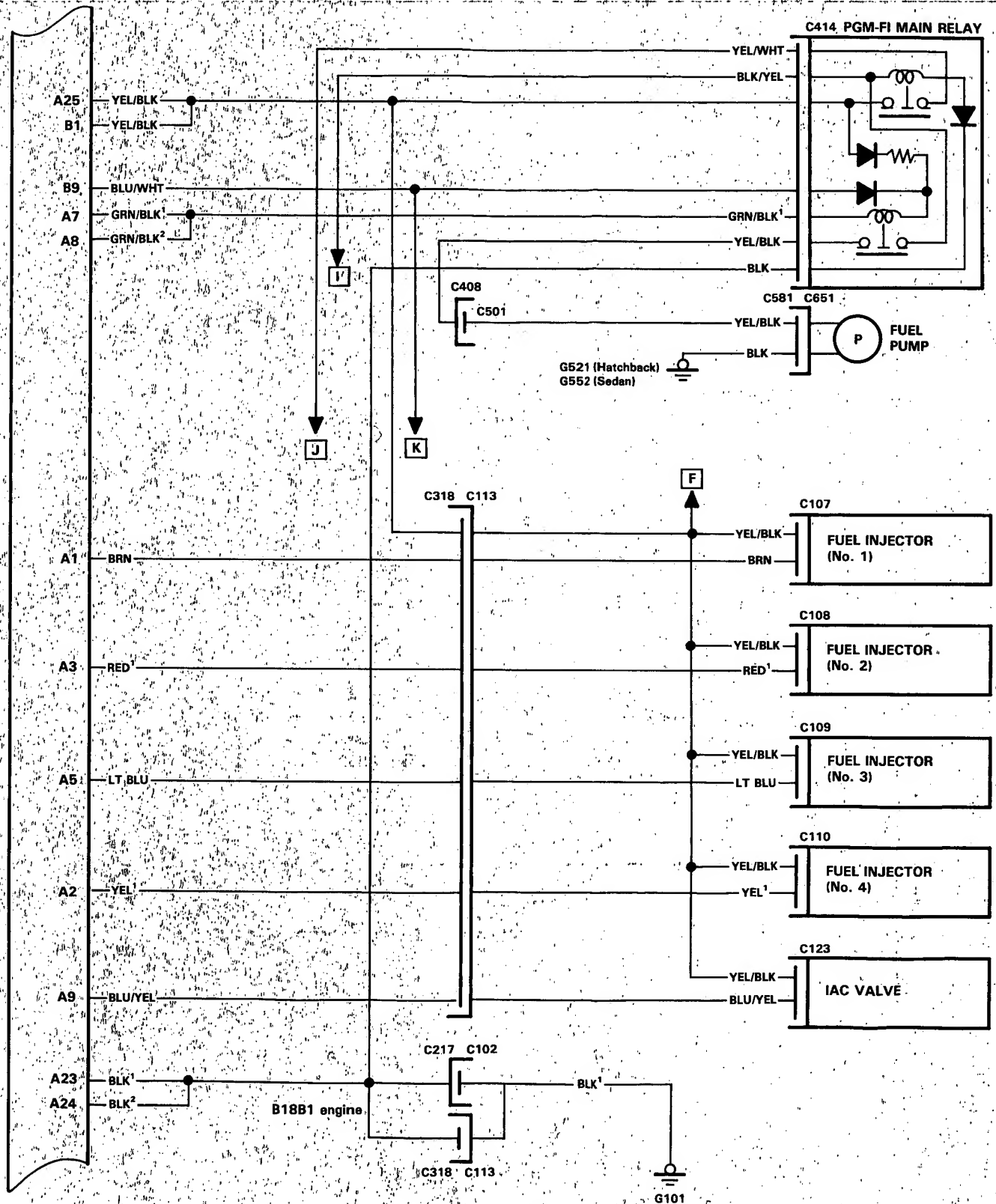




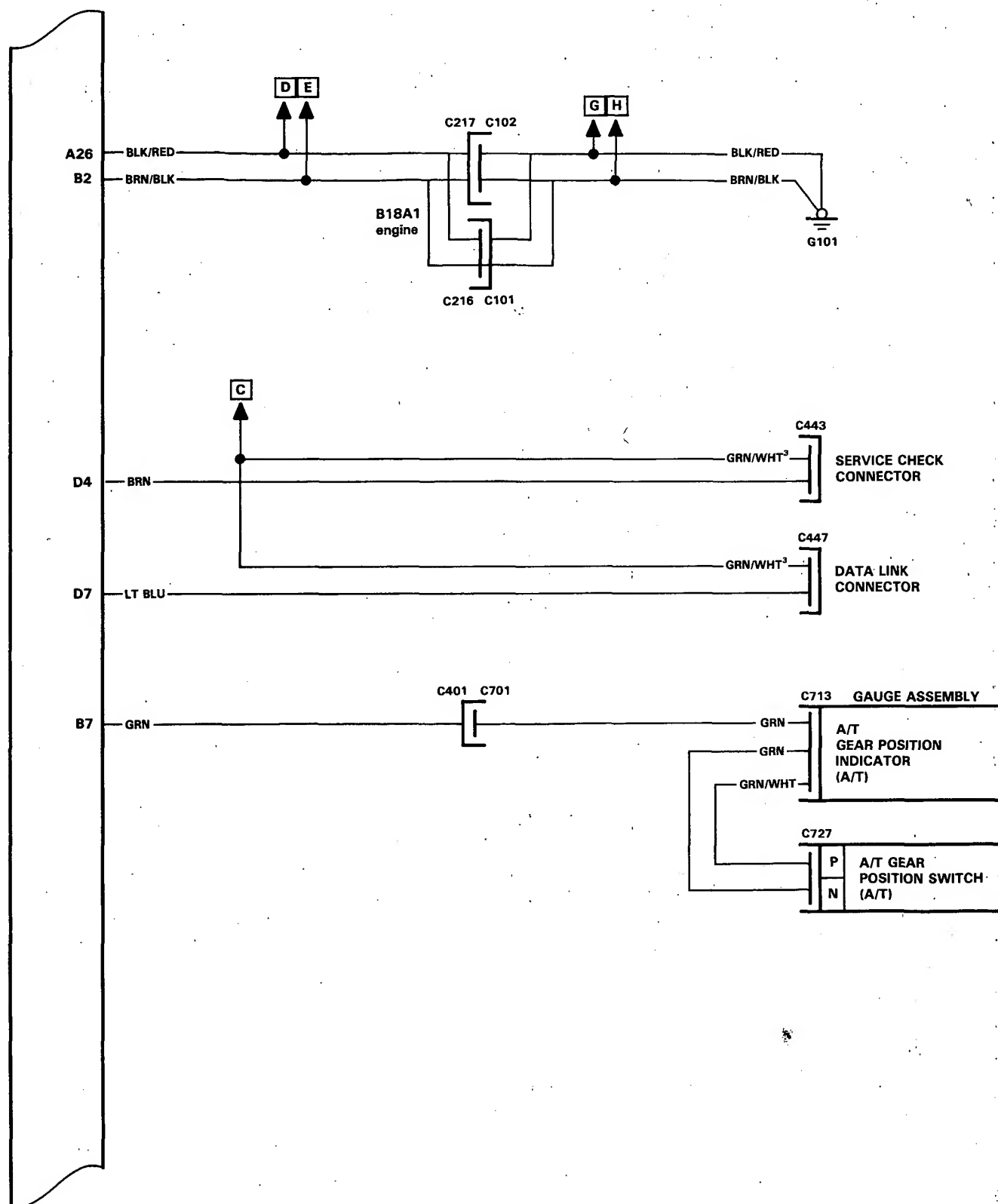
(cont'd)

# System Description

## Electrical connections (cont'd)



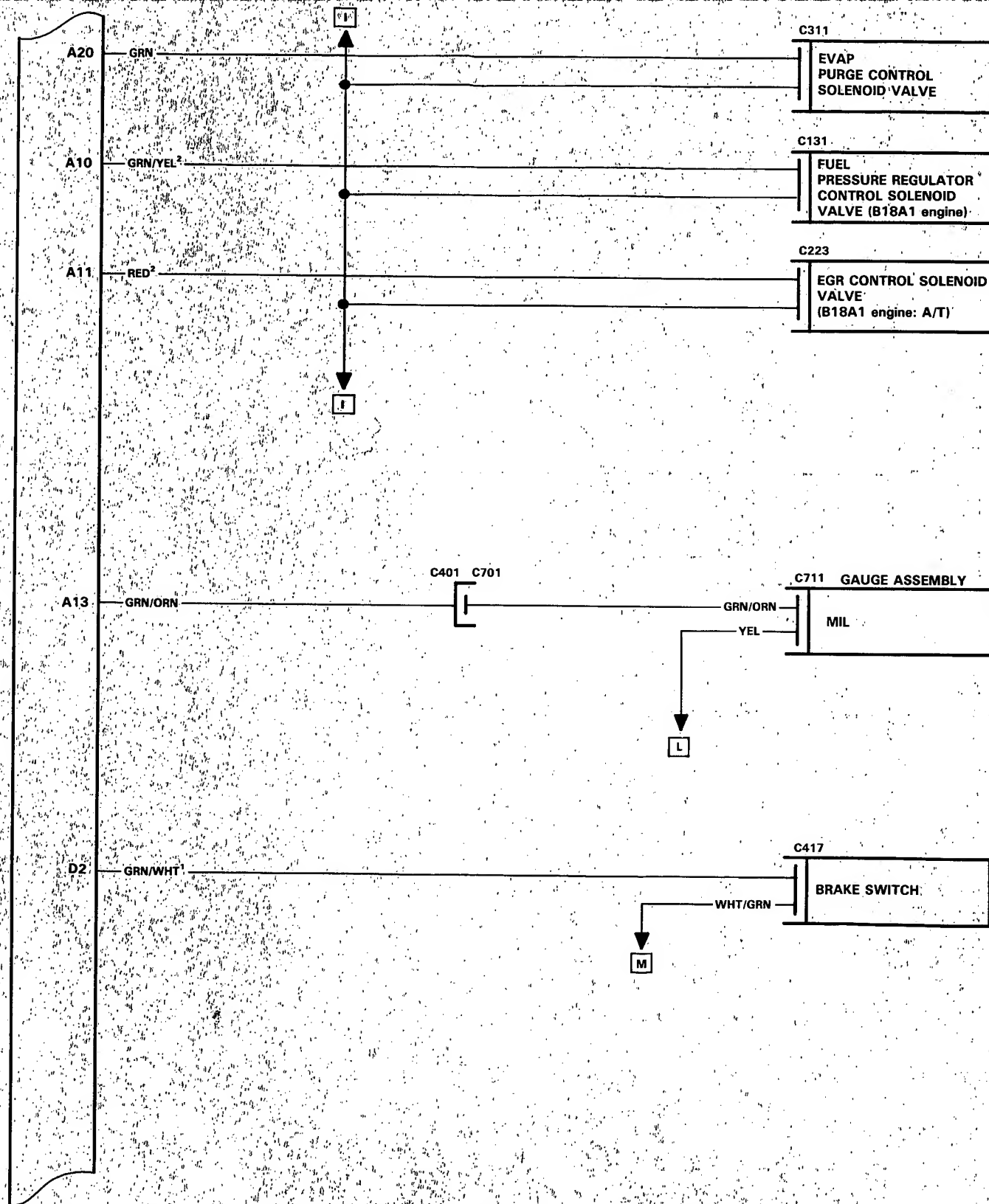


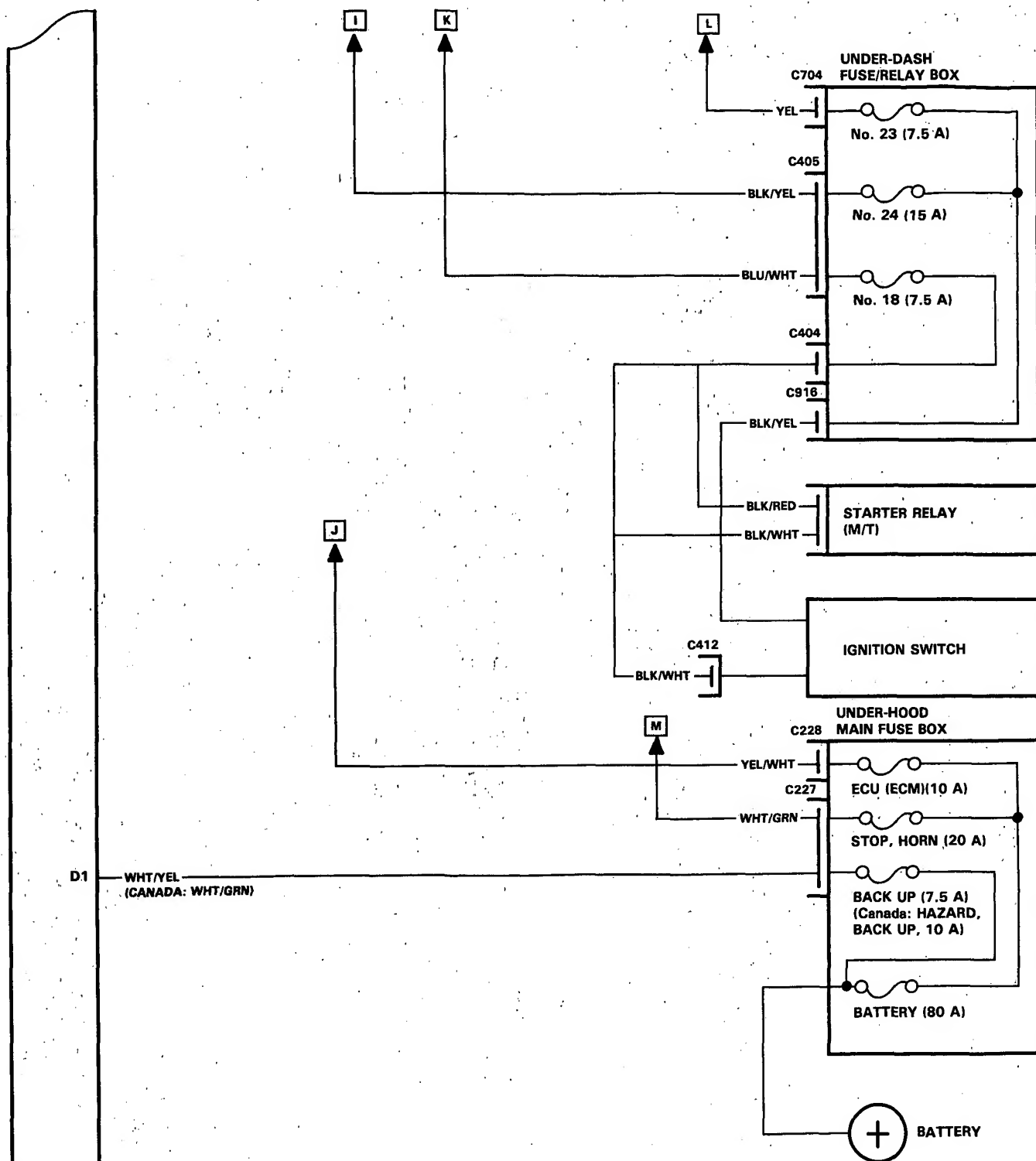


(cont'd)

# System Description

## Electrical connections (cont'd)

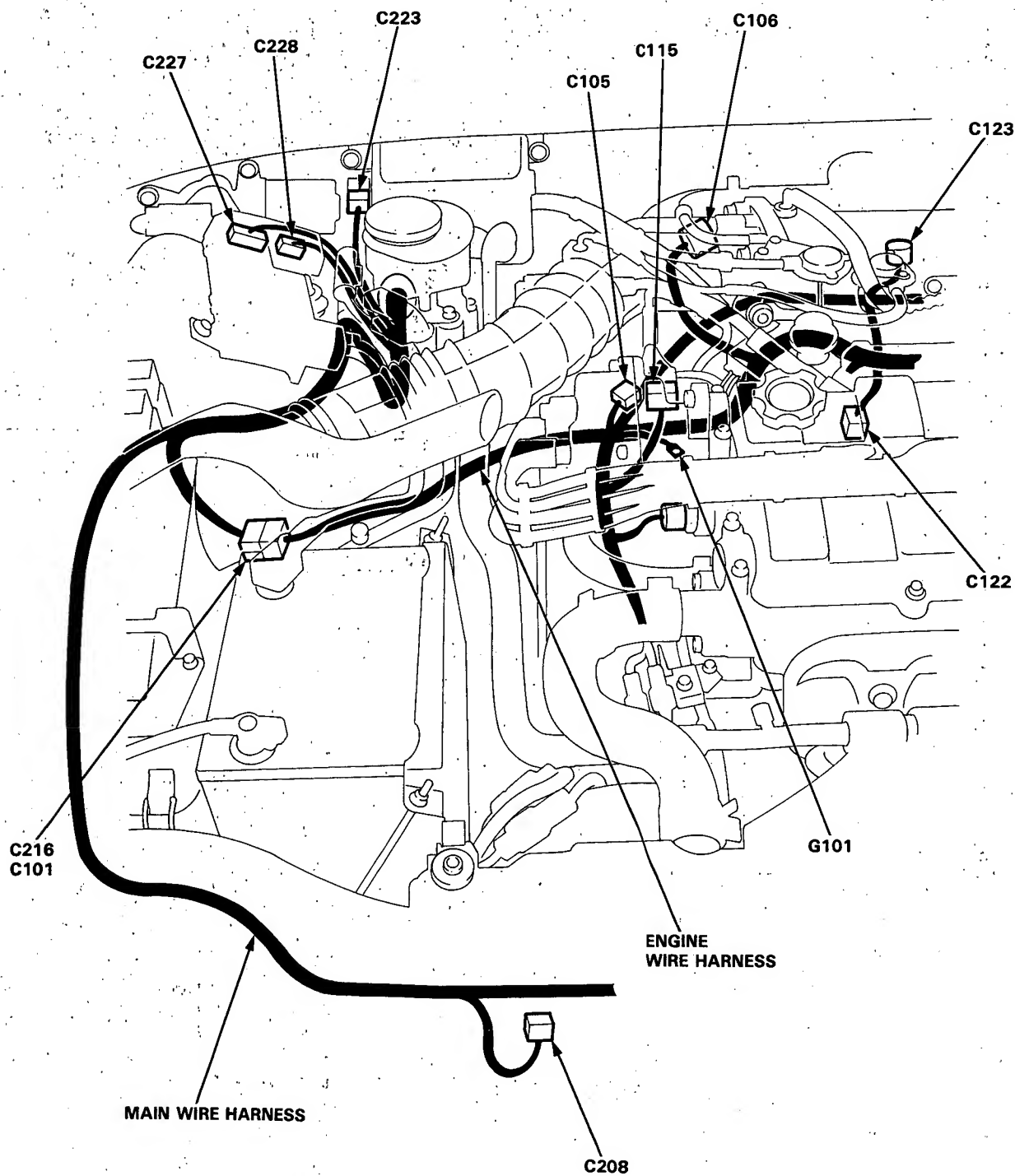




# System Description

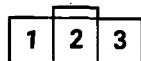
## System Connectors [Engine Compartment]

B18A1 engine:



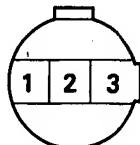


**C105 (A/T)**



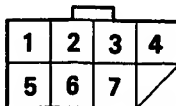
①	YEL/WHT
②	YEL
③	GRN/WHT <sup>3</sup>

**C106**



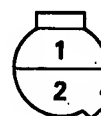
①	YEL/WHT
②	RED/BLU
③	GRN/WHT <sup>3</sup>

**C115**



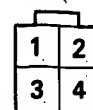
①	ORN	⑤	WHT
②	ORN/BLU	⑥	WHT/BLU
③	BLU/GRN	⑦	BLU/YEL
④	YEL/GRN <sup>1</sup>	⑧	—

**C117**



①	RED/WHT <sup>2</sup>
②	GRN/WHT <sup>3</sup>

**C122**



①	GRN/WHT <sup>3</sup>
②	WHT <sup>1</sup>
③	ORN/BLK
④	YEL/BLK

**C123**



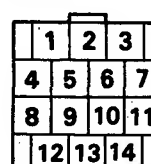
①	BLU/YEL
②	YEL/BLK

**C208**



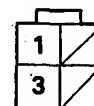
1	BLU/RED	4	BLK/YEL
2	YEL <sup>2</sup>	5	WHT
3	BLU/RED	6	BLU/RED

**C216**



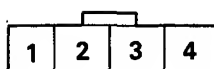
①	YEL/WHT	⑦	ORN/BLU
②	YEL (A/T)	⑧	WHT
③	YEL/RED (M/T)	⑨	ORN
④	YEL/WHT (A/T)	⑩	BLU/YEL
⑤	GRN/BLK (M/T)	⑪	BLU/GRN
⑥	RED/BLU	⑫	BLK/RED
⑬	WHT <sup>1</sup>	⑭	BRN/BLK
⑭	WHT/BLU	⑮	YEL/GRN <sup>1</sup>

**C223 (A/T)**



①	BLK/YEL
2	—
③	RED <sup>2</sup>
4	—

**C227**



①	WHT/GRN
2	WHT/GRN
3	WHT/RED
④	WHT/YEL
⑤	WHT/GRN*

**C228**



①	YEL/WHT
---	---------

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example YEL/BLK<sup>1</sup> and YEL/BLK<sup>2</sup> are not the same).

○: Related to Fuel and Emissions System.

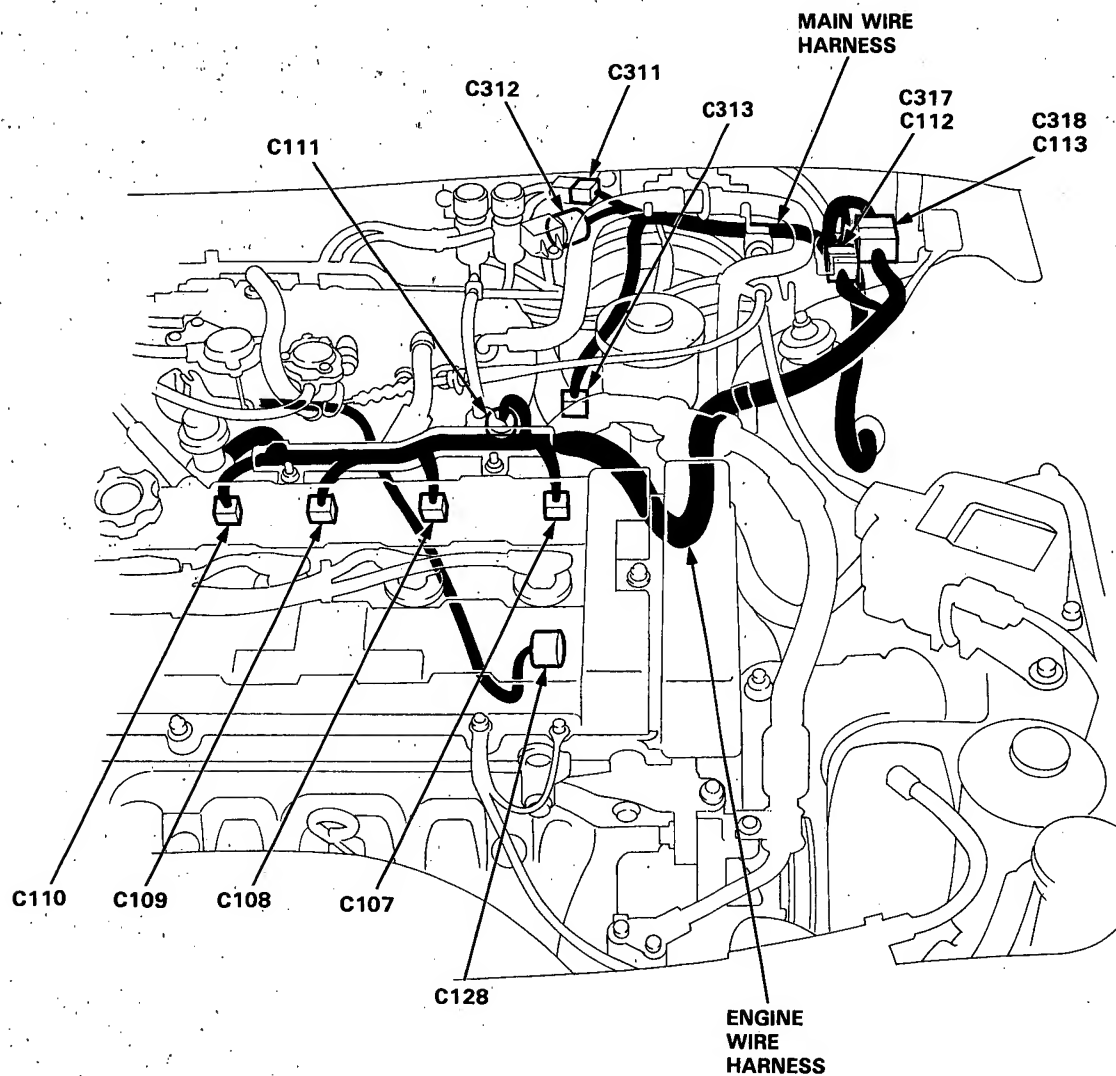
\*: Canada

(cont'd)

# System Description

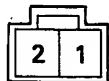
## System Connectors [Engine Compartment] (cont'd)

B18A1 engine:



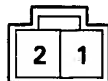


C107



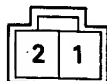
①	BRN
②	YEL/BLK

C108



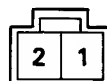
①	RED <sup>1</sup>
②	YEL/BLK

C109



①	LT BLU
②	YEL/BLK

C110



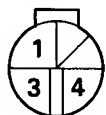
①	YEL <sup>1</sup>
②	YEL/BLK

C111



①	GRN/WHT <sup>3</sup>
②	RED/YEL

C128



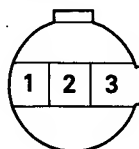
①	BLU
2	---
3	WHT/BLU
4	BLK/YEL

C311



①	GRN
②	BLK/YEL
③	GRN/YEL
④	BLK/YEL

C312



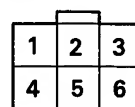
①	WHT <sup>2</sup>
②	GRN/WHT <sup>2</sup>
③	YEL/RED

C313



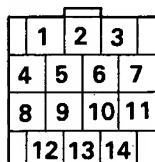
①	BLK
②	RED

C317



1	WHT/GRN**
2	YEL/RED
3	YEL/GRN
④	ORN/BLK
⑤	GRN/WHT <sup>3</sup>
⑥	GRN/WHT <sup>3</sup>

C318



①	BLU/YEL	8	WHT/BLU
②	RED/YEL	⑨	BLU
③	YEL/BLK	⑩	BLK <sup>1</sup>
④	YEL <sup>1</sup>	⑪	RED/WHT <sup>2</sup>
⑤	LT BLU	12	BLU
⑥	RED <sup>1</sup>	13	YEL/GRN
⑦	BRN	14	BLK/YEL

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example YEL/BLK<sup>1</sup> and YEL/BLK<sup>2</sup> are not the same).

○: Related to Fuel and Emissions System.

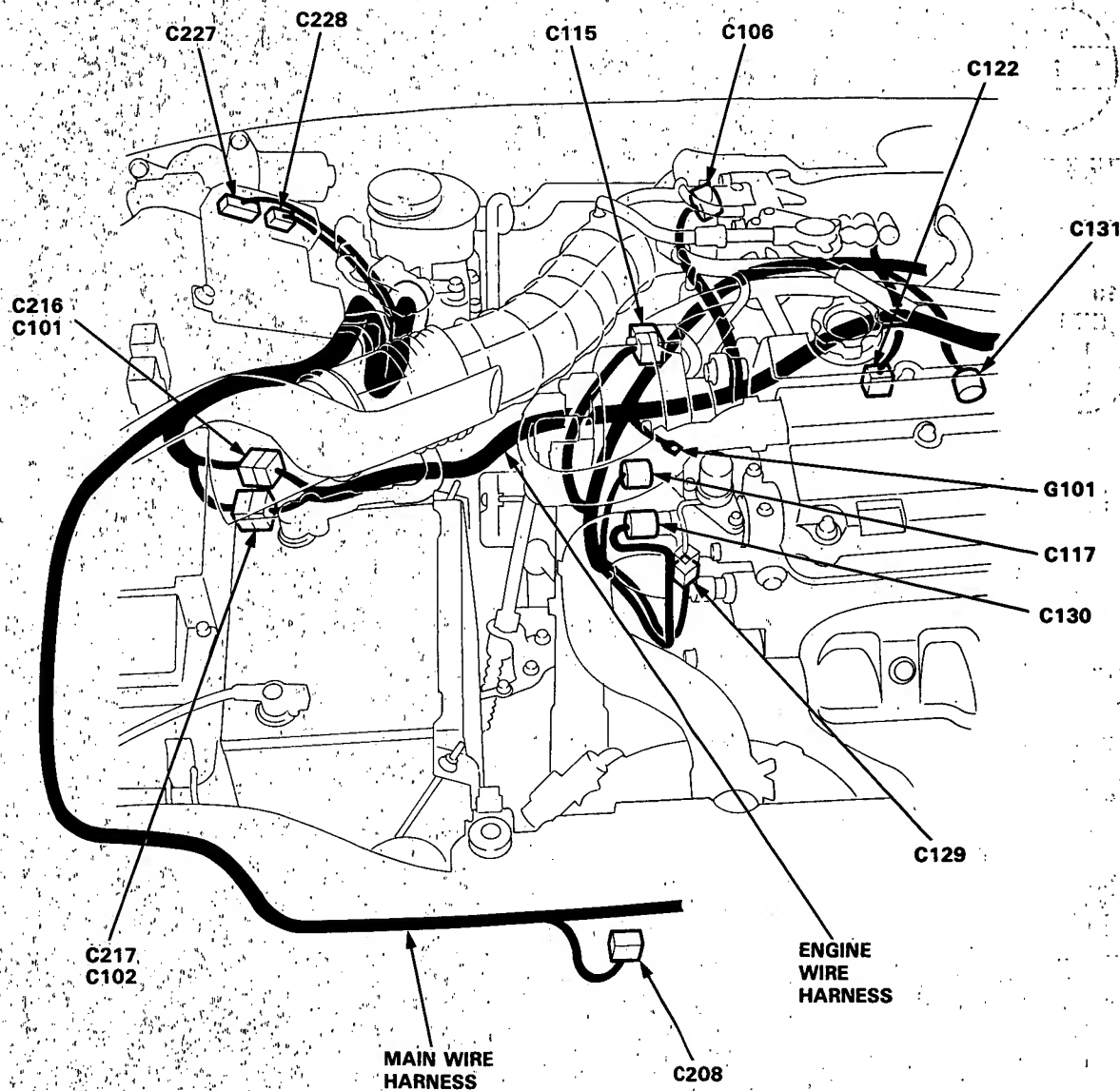
\*\* : Except Canada

(cont'd)

# System Description

## System Connectors [Engine Compartment] (cont'd)

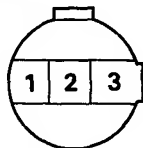
B17A1 engine:





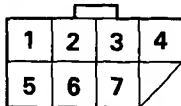


C106



①	YEL/WHT
②	RED/BLU
③	GRN/WHT <sup>3</sup>

C115



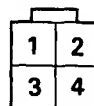
①	ORN	⑤	WHT
②	ORN/BLU	⑥	WHT/BLU
③	BLU/GRN	⑦	BLU/YEL
④	YEL/GRN <sup>1</sup>	⑧	—

C117



①	RED/WHT <sup>2</sup>
②	GRN/WHT <sup>3</sup>

C112



①	GRN/WHT <sup>3</sup>
②	WHT <sup>1</sup>
③	ORN/BLK
④	YEL/BLK

C129



①	GRN/YEL <sup>1</sup>
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C130



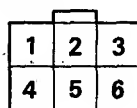
①	BLU/BLK
②	BLK <sup>1</sup>

C131



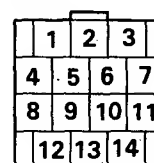
①	RED/BLU
2	—

C208



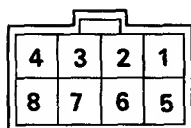
1	BLU/RED	4	BLK/YEL
②	YEL <sup>2</sup>	5	WHT
③	BLU/RED	6	BLU/RED

C216



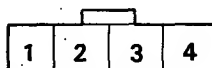
①	YEL/GRN <sup>1</sup>	⑧	ORN/BLK
2	YEL/GRN	⑨	WHT
3	YEL/RED	⑩	BLU/YEL
④	WHT <sup>1</sup>	⑪	WHT/BLU
⑤	ORN	⑫	RED/WHT <sup>2</sup>
⑥	BLU/GRN	⑬	GRN/YEL <sup>1</sup>
⑦	ORN/BLU	⑭	RED/BLU

C217



①	GRN/WHT <sup>3</sup>	5	YEL/GRN
2	WHT/GRN**	⑥	BLK <sup>1</sup>
③	BLK/RED	7	YEL/RED
④	BRN/BLK	8	GRN/BLK

C227



①	WHT/GRN
2	WHT/GRN
3	WHT/RED
④	WHT/YEL
④	WHT/GRN*

C228



①	YEL/WHT
---	---------

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example YEL/BLK<sup>1</sup> and YEL/BLK<sup>2</sup> are not the same).

○: Related to Fuel and Emissions System.

\*: Canada

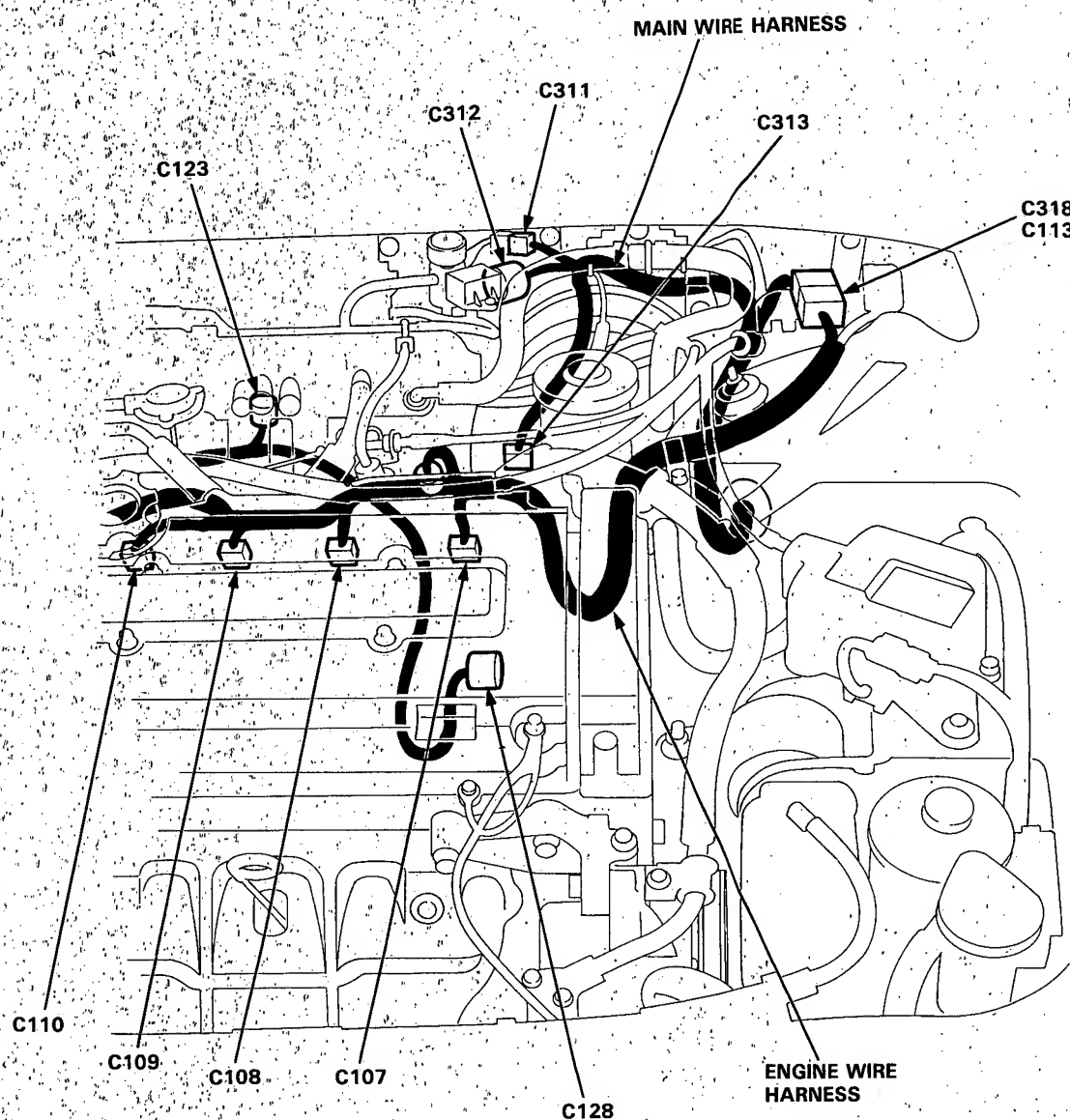
\*\* : Except Canada

(cont'd)

# System Description

## System Connectors [Engine Compartment] (cont'd)

B17A1 engine





C107



①	BRN
②	YEL/BLK

C108



①	RED <sup>1</sup>
②	YEL/BLK

C109



①	LT BLU
②	YEL/BLK

C110



①	YEL <sup>1</sup>
②	YEL/BLK

C111



①	GRN/WHT <sup>3</sup>
②	RED/YEL

C123



①	BLU/YEL
②	YEL/BLK

C128



①	BLU
②	---
③	WHT/BLU
④	BLK/YEL

C311



①	GRN
②	BLK/YEL
③	GRN/YEL <sup>2</sup>
④	BLK/YEL

C312



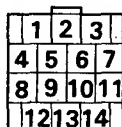
①	WHT <sup>3</sup>
②	GRN/WHT <sup>2</sup>
③	YEL/RED

C313



①	BLK
②	RED

C318



①	BLU/YEL	8	WHT/BLU
②	RED/YEL	⑨	BLU
③	YEL/BLK	⑩	YEL/WHT
④	YEL <sup>1</sup>	⑪	RED/BLU
⑤	LT BLU	12	BLU
⑥	RED <sup>1</sup>	⑬	BLU/BLK
⑦	BRN	14	BLK/YEL

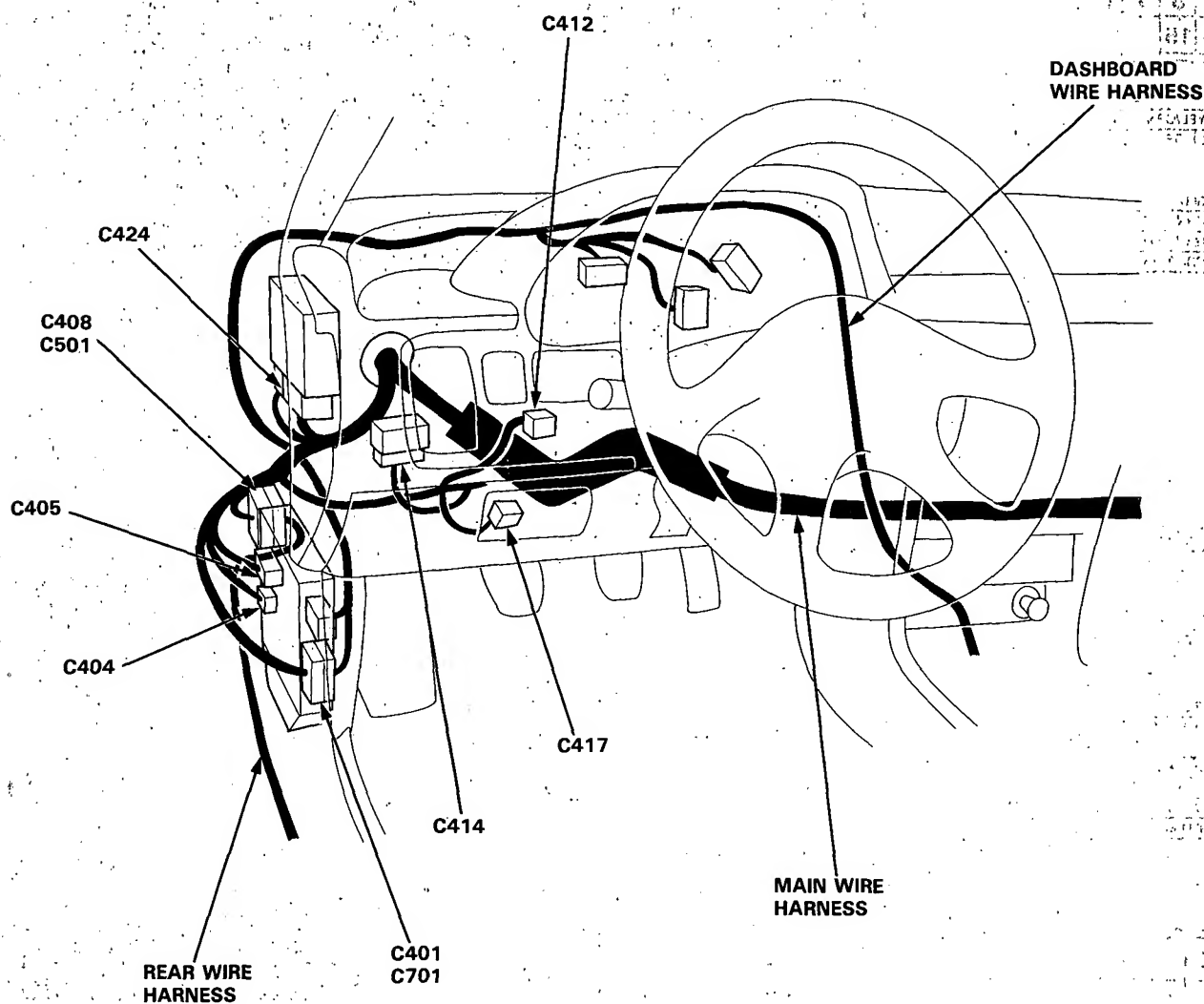
NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example YEL/BLK<sup>1</sup> and YEL/BLK<sup>2</sup> are not the same).

○: Related to Fuel and Emissions System.

(cont'd)

# System Description

## System Connectors [Dash and Floor] (cont'd)





C401 (M/T)

9	8	7	6	5	4	3	2	1
16	15		14	13	12		11	10

1 YEL/GRN	9 YEL/RED
2 LT GRN (LS, GS)	10 YEL/WHT
3 YEL/RED	11 RED (LS, GS)
4 RED/YEL	12 RED/BLU
5 BLU	13 RED
6 GRN/WHT	14 WHT/GRN
7 GRN/RED	⑩ YEL/RED
⑨ GRN/ORN	16 YEL/GRN

C401 (A/T)

13	12	11	10	9	8	7	6	5	4	3	2	1
24	23	22		21	20	19	18	17		16	15	14

1 BLU	13 YEL/RED
2 GRN/RED	14 GRN
③ GRN	15 GRN/BLU
4 GRN/YEL	16 GRN/BLK
5 WHT/RED	17 YEL/WHT
6 WHT/GRN	18 RED (LS, GS)
7 LT GRN (LS, GS)	19 PNK (LS, GS)
8 RED/YEL	20 RED/BLU
9 BLU	21 RED
10 GRN/RED	22 WHT/GRN
11 GRN/WHT	② YEL/RED
⑩ GRN/ORN	24 YEL/GRN

C404

1	2	3
4	5	6

1 RED/GRN
② BLK/RED (M/T)
③ BLK/WHT (A/T)
3 BLK/YEL
4 RED/YEL
⑤ BLK
6 RED/BLU

C405

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15		16	17	18	19		20	21	22

1 RED/YEL	12
2 BLK/YEL (A/T)	13 GRN/BLK
③ BLK/YEL	④ BLU/WHT
4	15 BLK/YEL
5 YEL	16 WHT
6 GRN/RED	17 GRN/YEL
7 RED/BLK	18 YEL/BLK
8 GRN/BLU	19 RED/GRN
9 WHT/BLU	20 WHT
10 WHT/BLU (GS)	21 RED/WHT
11 RED/BLU	22 RED/WHT

C408

7	6	5	4	3	2	1
13	12	11		10	9	8

1 RED/GRN*	7 GRN/BLU
2 WHT/YEL	8 BLK/YEL*
2 YEL/RED*	9 YEL**
3 WHT/BLU	10 GRN/BLK (M/T)
4 YEL/RED	11 GRN
5 LT GRN/BLK	12 GRN/WHT
⑥ YEL/BLK	13 GRN/RED

C412

1	2	3
4		5

1 WHT/YEL
1 WHT/GRN*
2 BLK/WHT
3 BLU/WHT
④ WHT/BLK
5 BLU/WHT

C414

2	4		8
1	3	5	7

① YEL/WHT	⑥ BLK/YEL
② BLK <sup>1</sup>	6
③ YEL/BLK	⑦ YEL/BLK
④ BLU/WHT	⑧ GRN/BLK <sup>1</sup>

C417 (LS, GS)

1	2
3	4

① WHT/GRN
2 LT GRN
3 GRY
④ GRN/WHT <sup>1</sup>

C417 (RS)

1
2

① WHT/GRN
② GRN/WHT <sup>1</sup>

C424

1	2	3	4			5	6	7	8
9	10	11	12	13	14	15	16	17	18

1 GRN/RED	10 BLU
2 GRN	⑩ RED/WHT <sup>2</sup>
3 GRN/BLK	12 GRN/WHT
4 GRN/BLU	13 YEL
5 GRN/YEL	14 GRY
6 YEL/RED	⑤ BLU/WHT
7 BRN/BLK	⑥ RED/BLU
8 WHT/RED	⑦ RED/WHT <sup>1</sup>
9 YEL	18 BLU

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example YEL/BLK<sup>1</sup> and YEL/BLK<sup>2</sup> are not the same).

○: Related to Fuel and Emissions System.

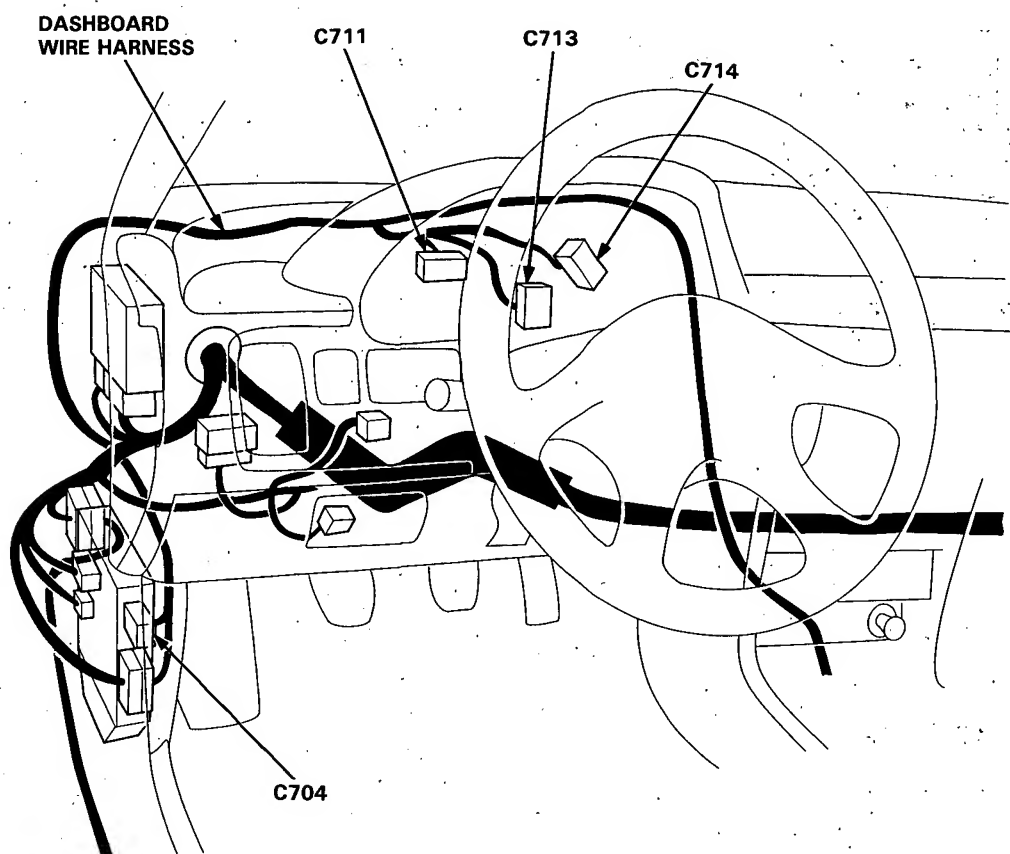
\*: Canada

\*\* : Except Canada

(cont'd)

# System Description

## System Connectors [Dash and Floor] (cont'd)





**C704**

1			4	5	6	7	8	9	10
11	12		13	14	15	16		17	18

1	RED/BLU	10	GRN/RED
2	---	11	YEL/WHT
3	---	12	BLK/YEL
4	WHT/BLU	13	WHT/BLU
5	YEL/RED	14	GRN/BLU
6	ORN	15	GRN/YEL
7	YEL/RED	16	BLK/YEL
8	YEL/RED	17	BLK
9	YEL	18	BLK/YEL

**C711**

1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	----	----	----

1	YEL/RED	7	YEL/GRN
2	WHT/BLU	8	GRN/RED
3	BLK/YEL	9	BLU
4	GRN/ORN	10	BLU/RED
5	YEL	11	RED/BLU
6	BLK	12	GRN/BLU

**C713**

1	2	3				4	5	6
7		9	10		11	12	13	14

1	GRN	8	---
2	GRN/WHT	9	RED
3	GRN/RED	10	GRN
4	GRN	11	BLU
5	GRN/BLK	12	YEL/WHT
6	GRN/YEL	13	RED/BLK
7	BLK	14	YEL

**C714**

1	2		4	5	6	7	8	9	10
---	---	--	---	---	---	---	---	---	----

1	GRN/YEL	6	YEL/WHT
2	RED/BLK	7	GRN/RED
3	---	8	GRN/BLK
4	RED	9	GRN/RED
5	YEL/RED	10	YEL/RED

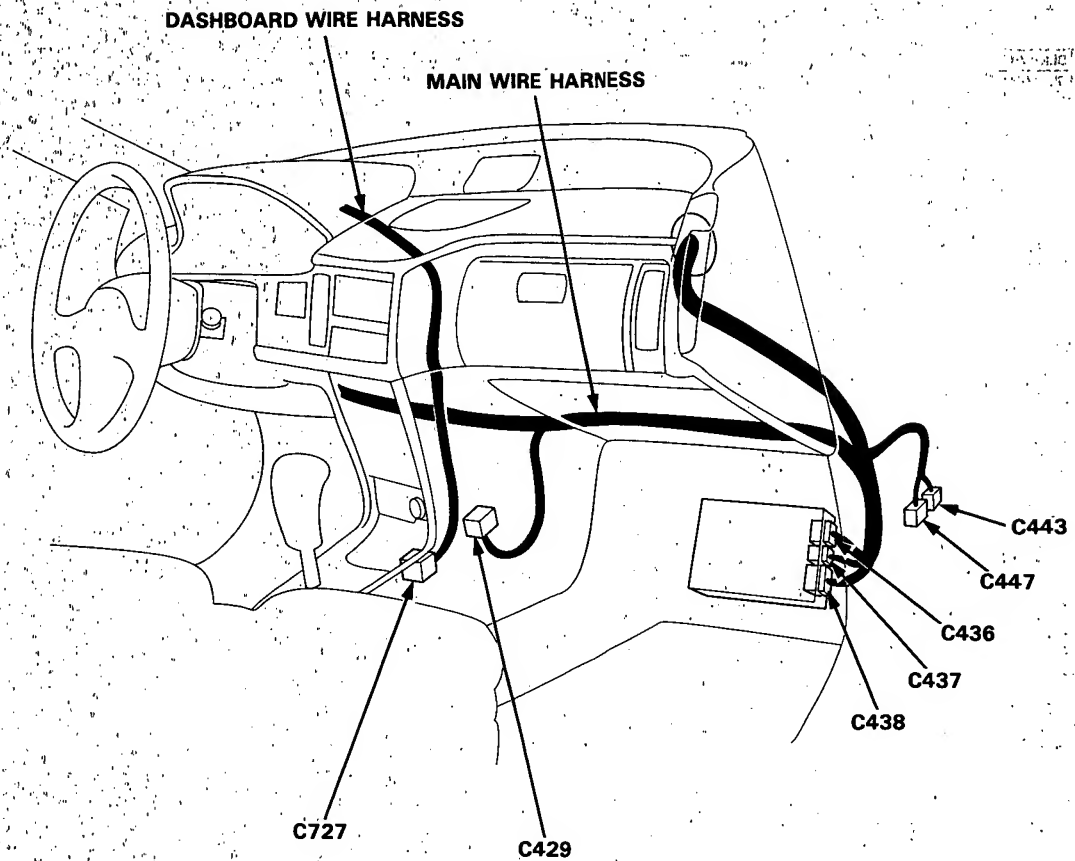
NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example YEL/BLK<sup>1</sup> and YEL/BLK<sup>2</sup> are not the same).

○: Related to Fuel and Emissions System.

(cont'd)

# System Description

## System Connectors [Dash and Floor] (cont'd)







C429

1	2
3	4

1	BLK/WHT
2	BLK/WHT
3	BLK/BLU
4	BLK/RED

C443

1	2
---	---

①	GRN/WHT <sup>3</sup>
2	BRN

C447

1	3
---	---

①	LT BLU
2	---
③	GRN/WHT <sup>3</sup>

C436

21	19	17	15	13	11	9	7	5	3	1
22	20	18	16	14	12	10	8	6	4	2

①	WHT/YEL	⑫	YEL (A/T)
①	WHT/GRN*	⑬	RED/WHT <sup>2</sup>
②	GRN/WHT <sup>1</sup>	⑭	WHT <sup>1</sup>
③	RED/BLU***	⑮	RED/YEL
④	BRN	⑯	BLU/WHT (A/T)
5	---	⑰	WHT <sup>2</sup>
⑥	BLU/BLK***	18	---
⑦	LT BLU	⑱	YEL/RED
⑧	RED/WHT <sup>1</sup> (A/T)	⑳	YEL/WHT
⑨	BLU	㉑	GRN/WHT <sup>2</sup>
10	---	㉒	GRN/WHT <sup>3</sup>
⑪	RED/BLU		

C437

15	13	11	9	7	5	3	1
16	14	12	10	8	6	4	2

①	YEL/BLK	⑥	BLU/WHT
②	BRN/BLK	⑦	YEL/RED
3	---	⑪	ORN
4	---	⑫	WHT
⑤	BLU/RED	⑬	ORN/BLU
6	---	⑭	WHT/BLU
⑦	GRN (A/T)	⑮	BLU/GRN
⑧	RED	⑯	BLU/YEL

C438

25	23	21	19	17	15	13	11	9	7	5	3	1
26	24	22	20	18	16	14	12	10	8	6	4	2

①	BRN	14	---
②	YEL <sup>1</sup>	⑮	YEL <sup>2</sup>
③	RED <sup>1</sup>	16	---
④	GRN/YEL <sup>1</sup> ***	17	---
⑤	LT BLU	18	---
⑥	ORN/BLK	19	---
⑦	GRN/BLK <sup>1</sup>	⑳	GRN
⑧	GRN/BLK <sup>2</sup>	㉑	YEL/GRN <sup>1</sup>
⑨	BLU/YEL	㉒	YEL/GRN <sup>2</sup>
⑩	GRN/YEL <sup>2</sup>	㉓	BLK <sup>1</sup>
⑪	RED <sup>2</sup> (A/T)	㉔	BLK <sup>2</sup>
12	---	㉕	YEL/BLK
⑬	GRN/ORN	㉖	BLK/RED

C727

1	2	3	4	5
6	7	8	9	10

1	GRN/BLK
2	GRN/BLU
3	GRN/YEL
4	BLK
⑤	GRN/WHT
⑥	GRN
7	GRN/RED
8	GRN/BLK
9	YEL/RED
10	PNK (LS, GS)

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example YEL/BLK<sup>1</sup> and YEL/BLK<sup>2</sup> are not the same).

○: Related to Fuel and Emissions System.

\*: Canada

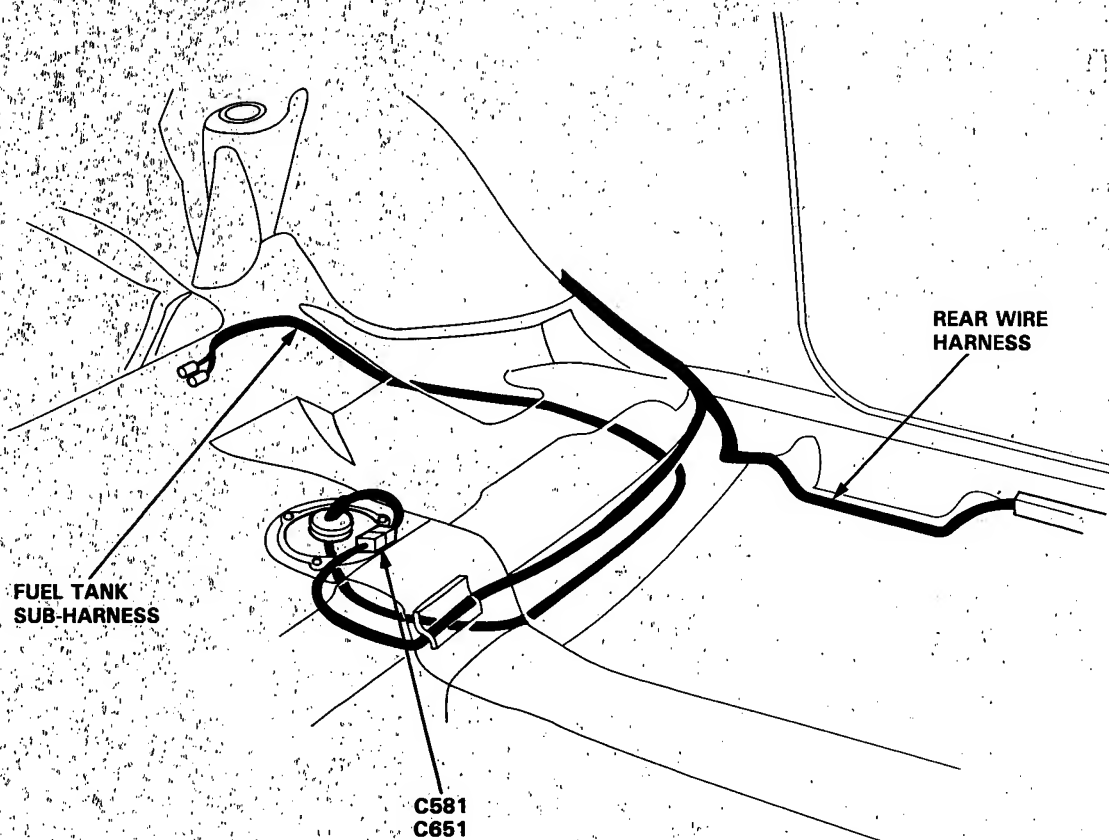
\*\*\*: B17A1 engine

(cont'd)

# System Description

## System Connectors [Fuel Pump] (cont'd)

Hatchback:





C581

1	2	3
	5	6

1	BLK/WHT	4	
2	GRN/RED	⑤	BLK
③	YEL/BLK	6	YEL/WHT

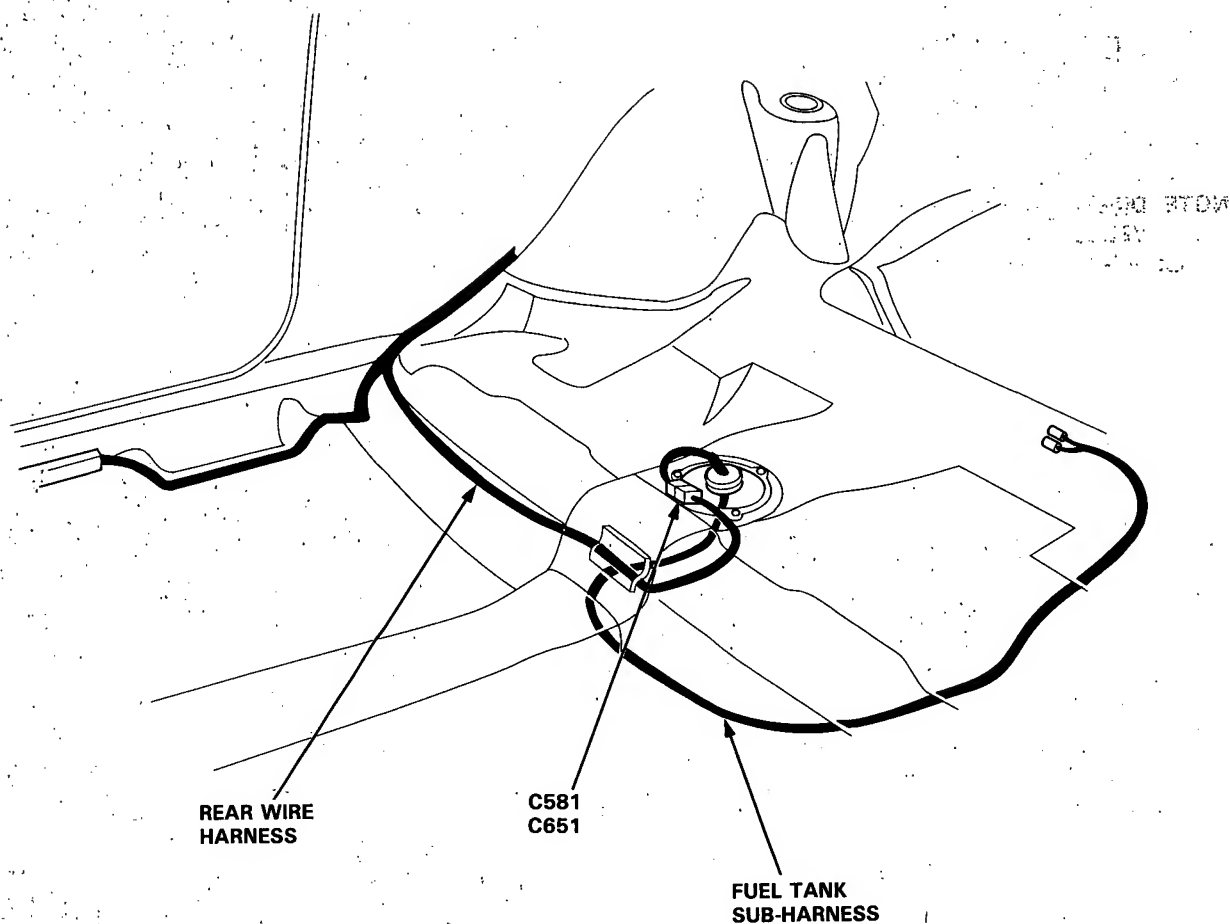
NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example YEL/BLK<sup>1</sup> and YEL/BLK<sup>2</sup> are not the same).

○: Related to Fuel and Emissions System.

# System Description

## System Connectors [Fuel Pump] (cont'd)

Sedan:





C581

1	2	3
	5	6

1	BLK/WHT	4	—
2	GRN/RED	⑤	BLK
③	YEL/BLK	6	YEL/WHT























NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example YEL/BLK<sup>1</sup> and YEL/BLK<sup>2</sup> are not the same).

○: Related to Fuel and Emissions System.

# Troubleshooting

## Troubleshooting Guide

NOTE: Across each row in the chart, the systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE	SYSTEM	PGM-FI									
		ENGINE CONTROL MODULE	HEATED OXYGEN SENSOR	MANIFOLD ABSOLUTE PRESSURE SENSOR	TOP DEAD CENTER/ CRANKSHAFT POSITION/ CYLINDER POSITION SENSOR	ENGINE COOLANT TEMPERATURE SENSOR	THROTTLE POSITION SENSOR	INTAKE AIR TEMPERATURE SENSOR	BAROMETRIC PRESSURE SENSOR	IGNITION OUTPUT SIGNAL	VEHICLE SPEED SENSOR
SYMPTOM		49	54, 56, 60	62, 66	68	70	72	74	76	78	80
MALFUNCTION INDICATOR LAMP (MIL)** TURNS ON											
MALFUNCTION INDICATOR LAMP (MIL)** BLINKS											
ENGINE WON'T START		①			③					③	
DIFFICULT TO START ENGINE WHEN COLD		(BU)		③	②	①					
IRREGULAR IDLING	WHEN COLD FAST IDLE OUT OF SPEC	(BU)				③					
	ROUGH IDLE	(BU)		③							
	WHEN WARM RPM TOO HIGH	(BU)									
	WHEN WARM RPM TOO LOW	(BU)									
FREQUENT STALLING	WHILE WARMING UP	(BU)				③					
	AFTER WARMING UP	(BU)									
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING	(BU)		②	③						
	FAILS EMISSION TEST	(BU)	③	②							
	LOSS OF POWER	(BU)		③			②				

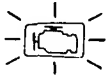
\* If codes other than those listed above are indicated, count the number of blinks again. If the MIL is in fact blinking these codes, replace the ECM.

(BU) If the MIL is on while the engine is running, jump the service check connector. If no code is displayed (MIL stays on steady), the back-up system is in operation. Substitute a known-good ECM and recheck. If the indication goes away, replace the original ECM.

\*\* USA:  
MALFUNCTION  
INDICATOR  
LAMP (MIL)



CANADA:  
CHECK  
ENGINE  
LIGHT



\*\*\* : B17A1 engine

\*\*\*\* : B18A1 engine (A/T)



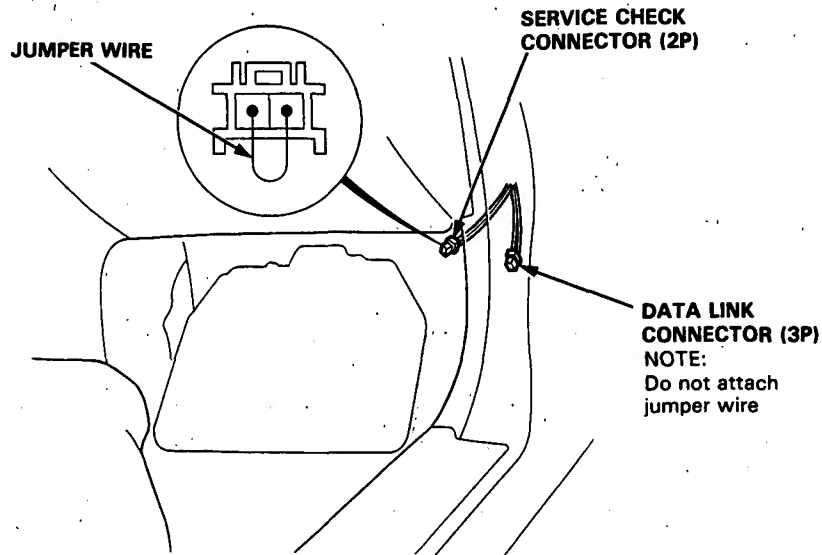
PGM-FI			IDLE CONTROL		FUEL SUPPLY		INTAKE AIR	EMISSION CONTROL	
VARIABLE VALVE TIMING & VALVE LIFT ELECTRONIC CONTROL SOLENOID VALVE	VARIABLE VALVE TIMING & VALVE LIFT ELECTRONIC CONTROL PRES-SURE SWITCH	KNOCK SENSOR ***	IDLE AIR CONTROL VALVE	OTHER IDLE CONTROLS	FUEL INJECTOR	OTHER FUEL SUPPLY		EXHAUST GAS RECIRCULATION CONTROL SYSTEM ***	OTHER EMISSION CONTROLS
6-30	6-32	82	88	84	108	105	123	136	132
						②			
			①	②					
			①		②			③	
			①	②					
			①		②				
			①	②		③			
			③			①		②	
					①			③	
									①
③	③				③	①	③		

# Troubleshooting

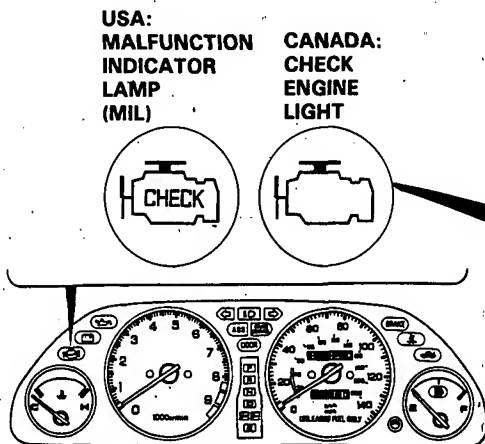
## Self-diagnostic Procedures

I. When the Malfunction Indicator Lamp (MIL) has been reported on, do the following:

1. Connect the Service Check Connector terminals with a jumper wire as shown. (The Service Check Connector (2P) is located under the dash on the passenger side of the car.) Turn the ignition switch on.



2. Note the Diagnostic Trouble Code (DTC): The MIL indicates a code by the length and number of blinks. The MIL can indicate simultaneous component problems by blinking separate codes, one after another. Codes 1 through 9 are indicated by individual short blinks. Codes 10 through 43 are indicated by a series of long and short blinks. The number of long blinks equals the first digit, the number of short blinks equals the second digit.



### Separate Problems:

#### Short

- = See DTC 1
- = See DTC 3
- = See DTC 13

#### Long short

### Simultaneous Problems:

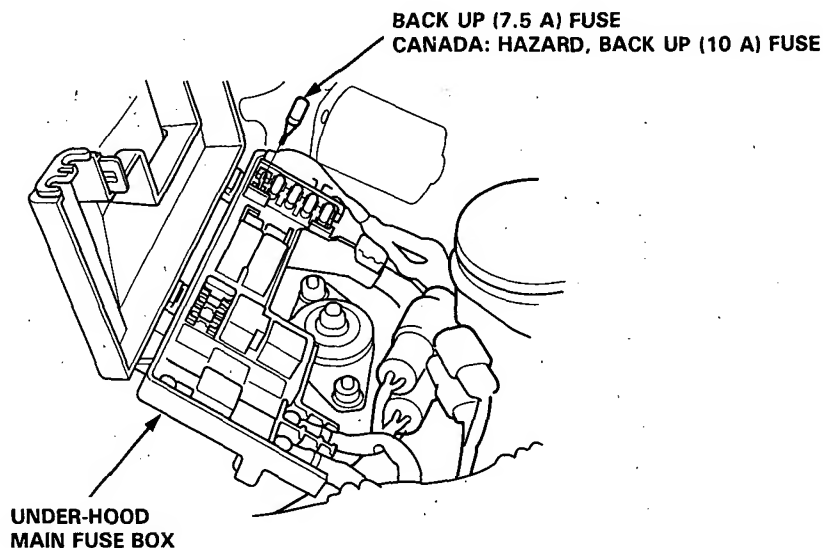
- = See DTC 1 and 3
- = See DTC 3 and 4
- = See DTC 3 and 14





## II. ENGINE CONTROL MODULE (ECM) Reset Procedure

1. Turn the ignition switch off.
2. Remove the BACK UP (7.5 A) fuse from the under-hood main fuse box for 10 seconds to reset the ECM.  
CANADA: Remove the HAZARD, BACK UP (10 A) fuse from the under-hood main fuse box for 10 seconds to reset ECM.



## III. Final Procedure (this procedure must be done after any troubleshooting)

1. Remove the Jumper Wire.

NOTE: If the Service Check Connector is jumped, the MIL will stay on.

2. Do the ECM Reset Procedure.

(cont'd)

# Troubleshooting

## Self-diagnostic Procedures (cont'd)

DIAGNOSTIC TROUBLE CODE (DTC)	SYSTEM INDICATED	Page
0	ENGINE CONTROL MODULE (ECM)	11-49
1	HEATED OXYGEN SENSOR (HO2S)	11-54
3	MANIFOLD ABSOLUTE PRESSURE (MAP SENSOR)	11-62, 66
5		
4	CRANKSHAFT POSITION (CKP SENSOR)	11-68
6	ENGINE COOLANT TEMPERATURE (ECT SENSOR)	11-70
7	THROTTLE POSITION (TP SENSOR)	11-72
8	TOP DEAD CENTER POSITION (TDC SENSOR)	11-68
9	No.1 CYLINDER POSITION (CYP SENSOR)	11-68
10	INTAKE AIR TEMPERATURE (ITA SENSOR)	11-74
12	EXHAUST GAS RECIRCULATION (EGR VALVE LIFT SENSOR)**	11-136
13	BAROMETRIC PRESSURE (BARO SENSOR)	11-76
14	IDLE AIR CONTROL (IAC VALVE)	11-88
15	IGNITION OUTPUT SIGNAL	11-78
16	FUEL INJECTOR	11-108
17	VEHICLE SPEED SENSOR (VSS)	11-80
21	VARIABLE VALVE TIMING & VALVE LIFT ELECTRONIC CONTROL SOLENOID VALVE (VTEC SOLENOID VALVE)*	6-30
22	VARIABLE VALVE TIMING & VALVE LIFT ELECTRONIC CONTROL PRESSURE SWITCH (VTEC PRESSURE SWITCH)*	6-32
23	KNOCK SENSOR (KS)*	11-82
41	HEATED OXYGEN SENSOR (HO2S) HEATER	11-56
43	FUEL SUPPLY SYSTEM	11-60

\*: B17A1 engine

\*\*: B18A1 engine (A/T)

- If codes other than those listed above are indicated, verify the code. If the code indicated is not listed above, replace the ECM.
- The MIL may come on, indicating a system problem when, in fact, there is a poor or intermittent electrical connection. First, check the electrical connections, clean or repair connections if necessary.

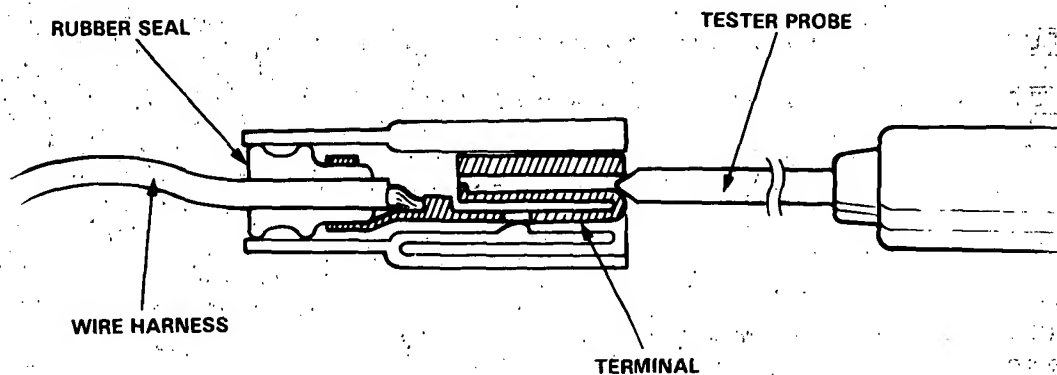


# Troubleshooting

## Self-diagnostic Procedures (cont'd)

### CAUTION:

- Puncturing the insulation on a wire can cause poor or intermittent electrical connections.
- For testing at connectors other than the test harness, bring the tester probe into contact with the terminal from the connector side of wire harness connectors in the engine compartment. For female connectors, just touch lightly with the tester probe and do not insert the probe.





## How to Read Flowcharts

A flowchart is designed to be used from start to final repair. It's like a map showing you the shortest distance. But beware: if you go off the "map" anywhere but a "stop" symbol, you can easily get lost.

### **START**

(bold type)

Describes the conditions or situation to start a troubleshooting flowchart.

### **ACTION**

Asks you to do something; perform a test, set up a condition etc.

### **DECISION**

Asks you about the result of an action, then sends you in the appropriate troubleshooting direction.

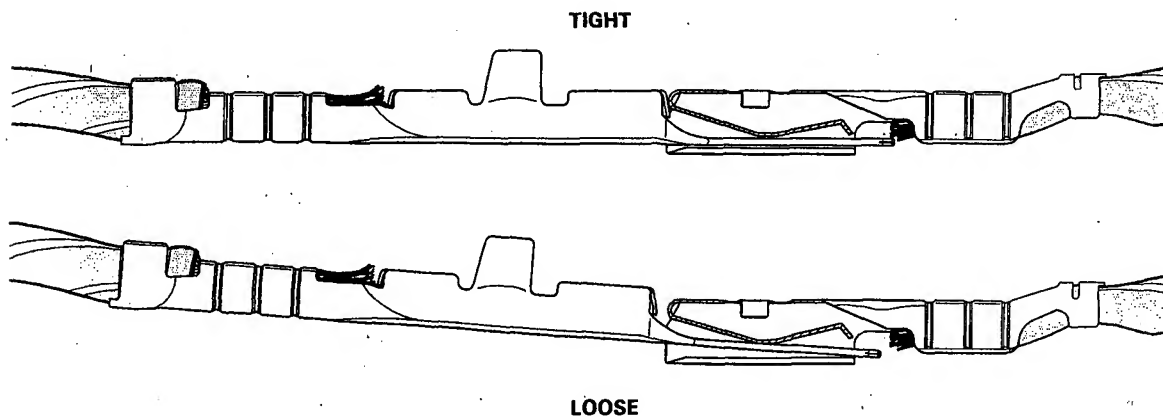
### **STOP**

(bold type)

The end of a series of actions and decisions, describes a final repair action and sometimes directs you to an earlier part of the flowchart to confirm your repair.

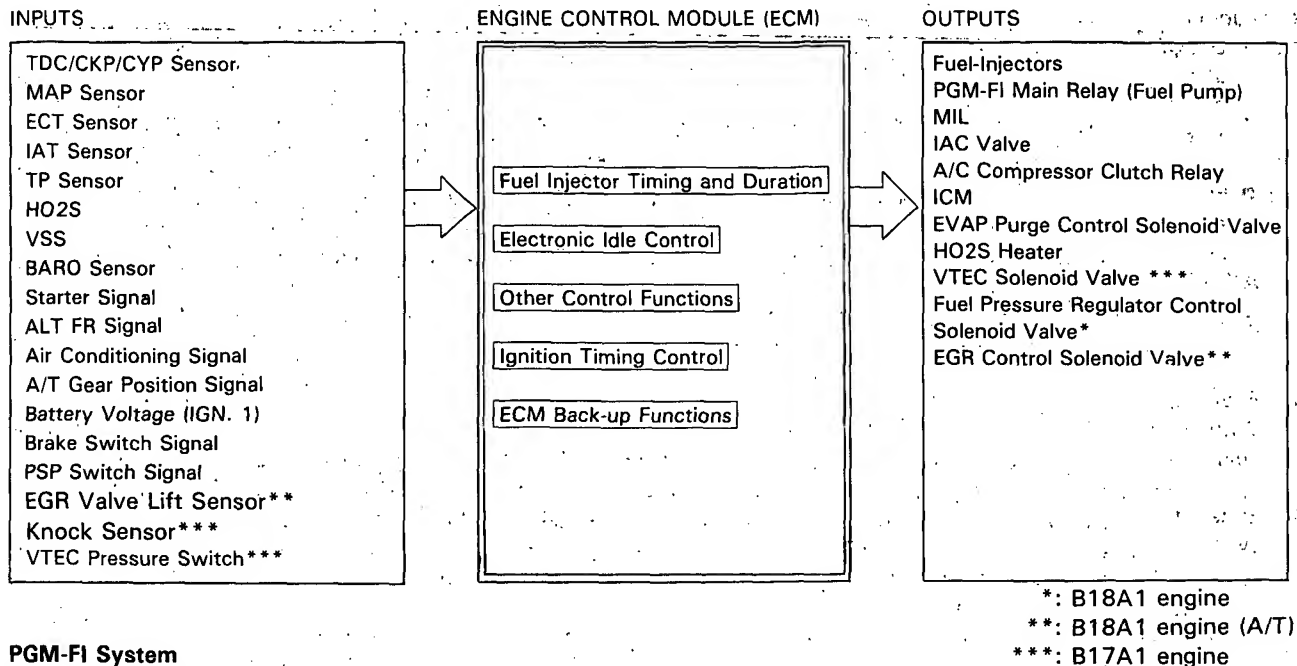
### NOTE:

- The term "Intermittent Failure" is used in these charts. It simply means a system may have had a failure, but it checks out OK at this time. If the Malfunction Indicator Lamp (MIL) on the dash does not come on, check for poor connections or loose wires at all connectors related to the circuit that you are troubleshooting (see illustration below).
- Most of the troubleshooting flowcharts have you reset the Engine Control Module (ECM) and try to duplicate the Diagnostic Trouble Code (DTC). If the problem is intermittent and you can't duplicate the code, do not continue through the flowchart. To do so will only result in confusion and possibly, a needlessly replaced ECM.
- "Open" and "Short" are common electrical terms. An open is a break in a wire or at a connection. A short is an accidental connection of a wire to ground or to another wire. In simple electronics, this usually means something won't work at all. In complex electronics (like ECM's), this can sometimes mean something works, but not the way it's supposed to.
- If the electrical readings are not as specified when using the test harness, check the test harness connections before proceeding.



# PGM-FI System

## System Description



### PGM-FI System

The PGM-FI system on this model is a sequential multiport fuel injection system.

#### Fuel Injector Timing and Duration

The ECM contains memories for the basic discharge durations at various engine speeds and manifold pressures. The basic discharge duration, after being read out from the memory, is further modified by signals sent from various sensors to obtain the final discharge duration.

#### Idle Air Control

Idle Air Control Valve (IAC Valve)

When the engine is cold, the A/C compressor is on, the transmission is in gear (A/T only) or the alternator is charging, the ECM controls current to the IAC Valve to maintain correct idle speed.

#### Ignition Timing Control

- The ECM contains memories for basic ignition timing at various engine speeds and manifold pressures. Ignition timing is also adjusted for engine coolant temperature.
- A Knock Control System is also used. When detonation is detected by the knock sensor, the ignition timing is retarded (B17A1 engine).

#### Other Control Functions

##### 1. Starting Control

When the engine is started, the ECM provides a rich mixture by increasing fuel injector duration.

##### 2. Fuel Pump Control

- When the ignition switch is initially turned on, the ECM supplies ground to the PGM-FI main relay that supplies current to the fuel pump for two seconds to pressurize the fuel system.
- When the engine is running, the ECM supplies ground to the PGM-FI main relay that supplies current to the fuel pump.
- When the engine is not running and the ignition is on, the ECM cuts ground to the PGM-FI main relay which cuts current to the fuel pump.



### 3. Fuel Cut-off Control

- During deceleration with the throttle valve closed, current to the fuel injectors is cut off to improve fuel economy at speeds over following rpm:
  - B18A1 engine: 915 rpm
  - B17A1 engine: 945 rpm
- Fuel cut-off action also takes place when engine speed exceeds, 7,000 rpm (B18A1 engine), 8,100 rpm (B17A1 engine), regardless of the position of the throttle valve, to protect the engine from over-revving.

### 4. A/C Compressor Clutch Relay

When the ECM receives a demand for cooling from the air conditioning system, it delays the compressor from being energized, and enriches the mixture to assure smooth transition to the A/C mode.

### 5. Evaporative Emission (EVAP) Purge Control Solenoid Valve

When the engine coolant temperature is below 165°F (74°C), the ECM supplies a ground to the EVAP purge control solenoid valve which cuts vacuum to the EVAP purge control diaphragm valve.

### 6. Exhaust Gas Recirculation (EGR) Control Solenoid Valve (B18A1 engine: A/T)

When the EGR is required for control of oxides of nitrogen (NOx) emissions, the ECM supplies ground to the EGR control solenoid valve which supplies regulated vacuum to EGR valve.

### 7. Fuel Pressure Regulator Control Solenoid Valve (B18A1 engine)

When the engine coolant temperature is above 196°F (91°C) and the intake air temperature is above 165°F (74°C), the fuel pressure regulator control solenoid valve is energized, cutting manifold vacuum to the fuel pressure regulator for about 60 seconds after starting engine.

## ECM fail-safe/back-up Functions

### 1. Fail-safe Function

When an abnormality occurs in a signal from a sensor, the ECM ignores that signal and assumes a pre-programmed value for that sensor that allows the engine to continue to run.

### 2. Back-up Function

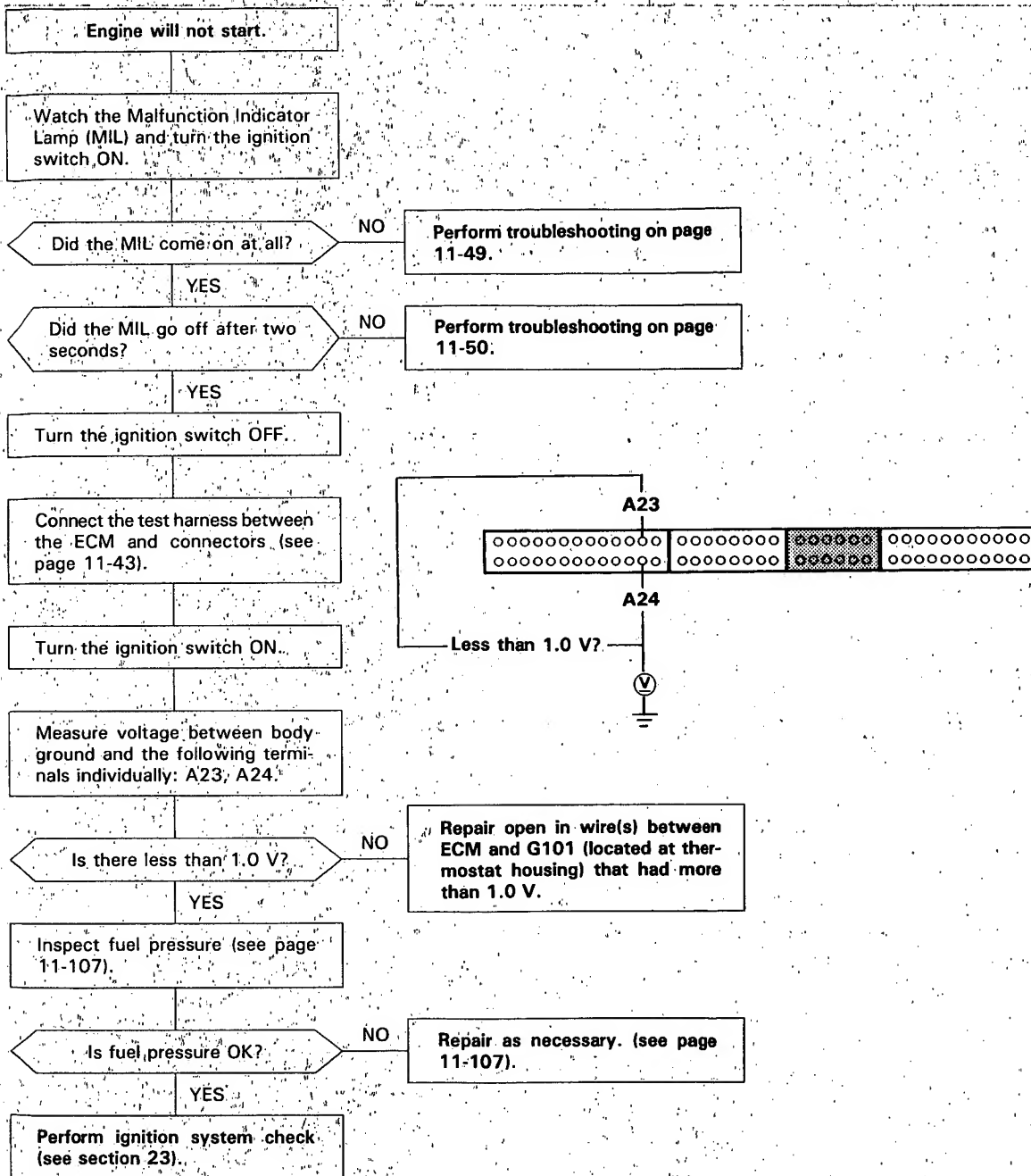
When an abnormality occurs in the ECM itself, the injectors are controlled by a back-up circuit independent of the system in order to permit minimal driving.

### 3. Self-diagnosis Function [Malfunction Indicator Lamp (MIL)]

When an abnormality occurs in a signal from a sensor, the ECM supplies ground for the MIL and stores the code in erasable memory. When the ignition is initially turned on, the ECM supplies ground for the MIL for two seconds to check the MIL bulb condition.

# PGM-FI System

## Troubleshooting Flowchart — Engine Will Not Start







## Troubleshooting Flowchart — Engine Control Module (ECM)

The Malfunction Indicator Lamp (MIL) never comes on (even for two seconds) after ignition is turned on.

Is the low oil pressure light on?

NO

Inspect No. 23 (7.5 A) fuse.

YES

Turn the ignition switch OFF.

Connect the test harness between the ECM and connectors (see page 1-43).

Connect A13 terminal to body ground.

Turn the ignition switch ON.

Is the MIL on?

NO

- Replace the MIL bulb.
- Repair open in GRN/ORN wire between ECM (A13) and gauge assembly.

YES

Measure voltage between body ground and the following terminals individually: A23, A24.

Is there less than 1.0 V?

NO

Repair open in wire(s) between ECM and G101 (located at thermostat housing) that had more than 1.0 V.

YES

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.

Is No. 23 (7.5 A) fuse OK?

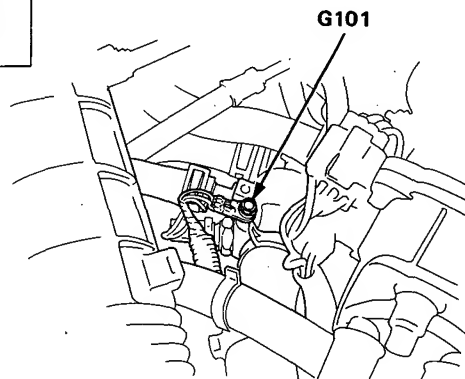
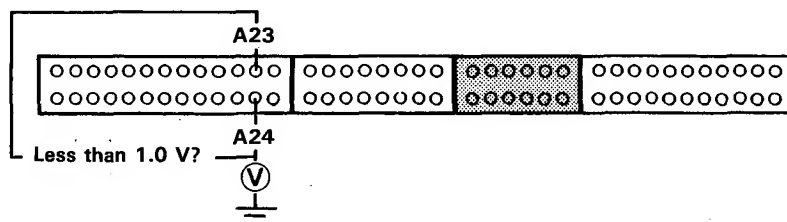
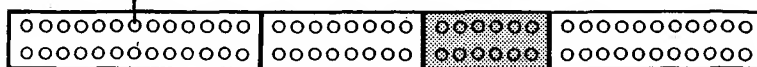
NO

Replace the fuse.

YES

Repair open in YEL wire between No. 23 (7.5 A) fuse and gauge assembly.

A13

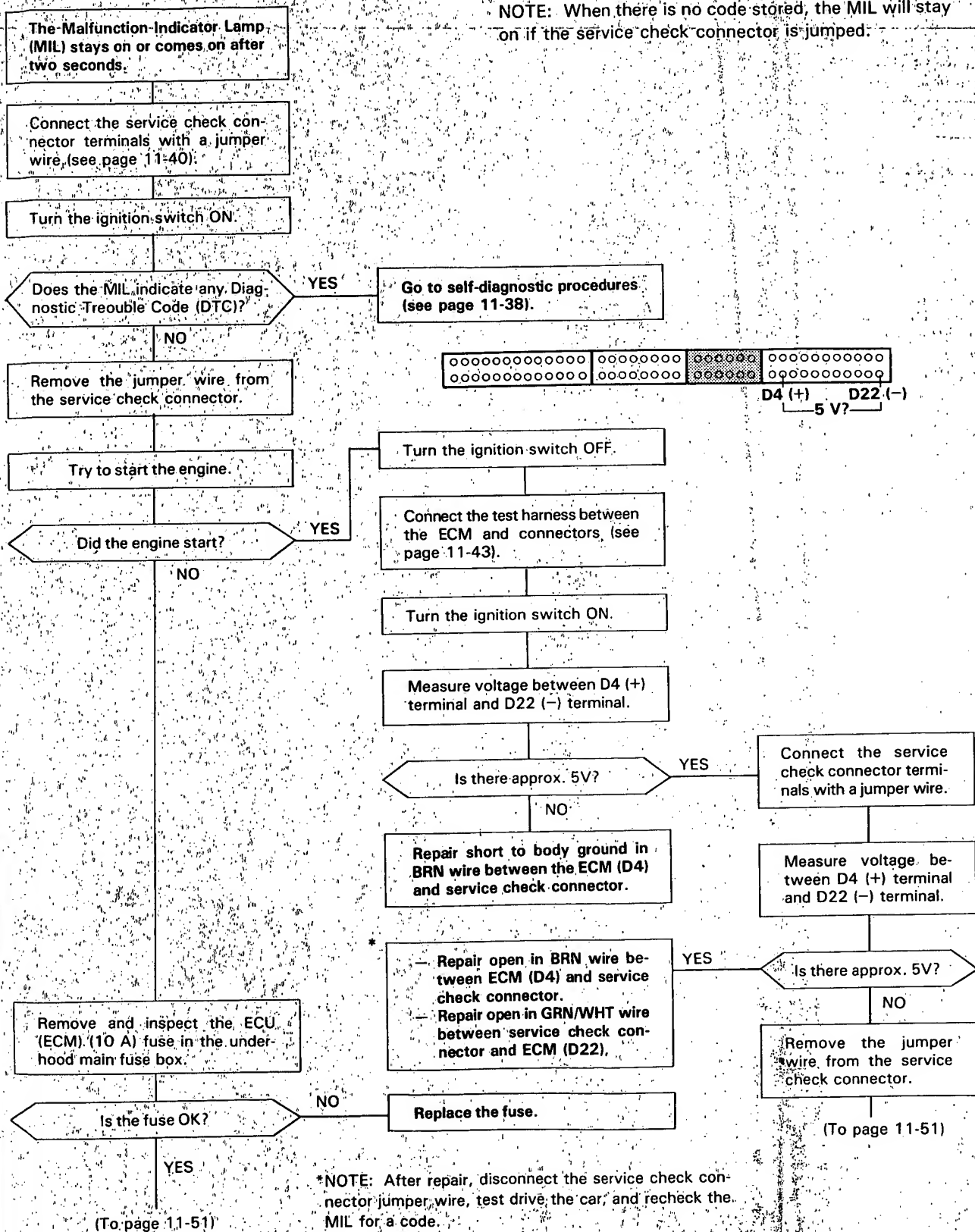


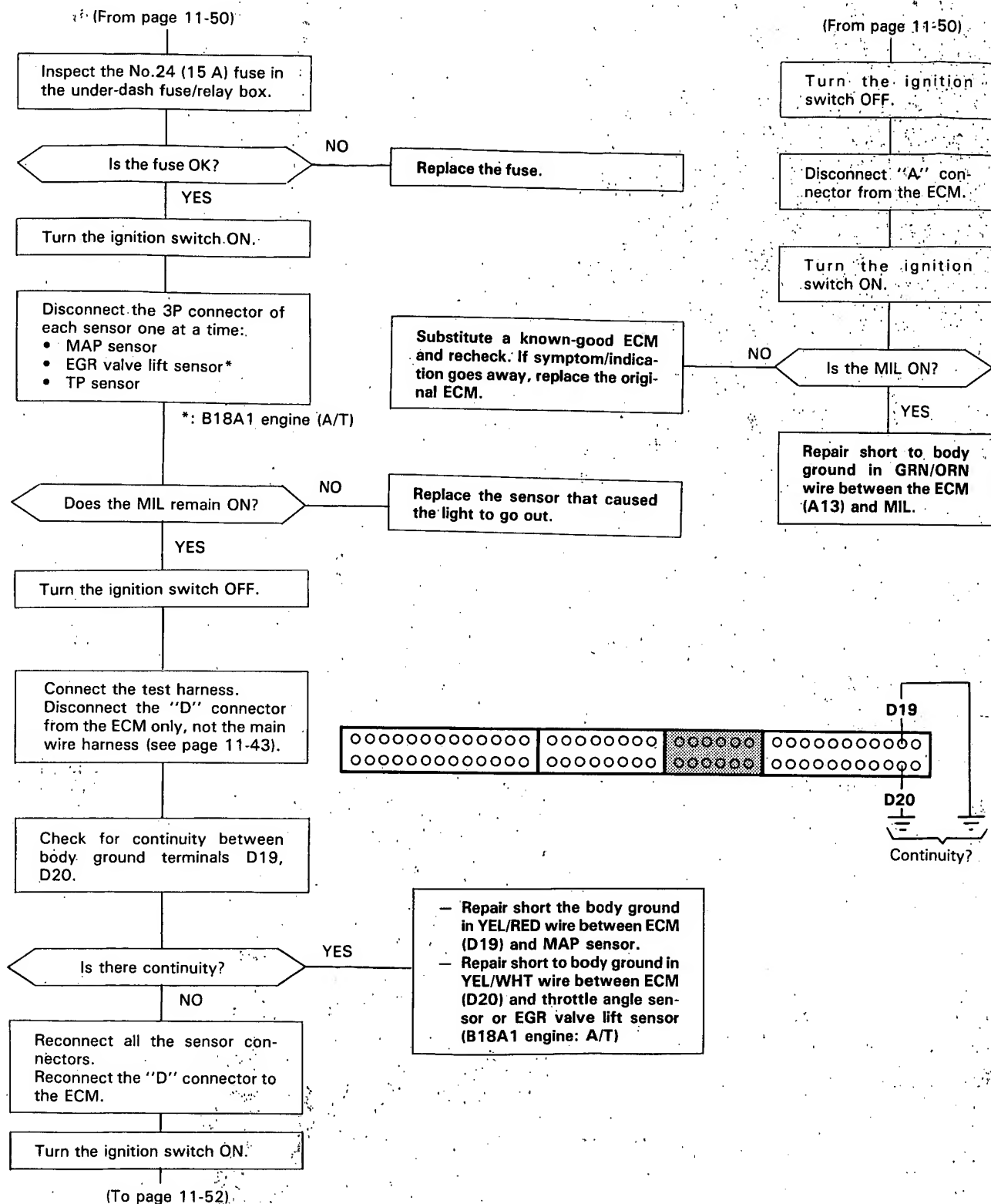
(cont'd)

# PGM-FI System

## Troubleshooting Flowchart — Engine Control Module (ECM) (cont'd)

NOTE: When there is no code stored, the MIL will stay on if the service check connector is jumped.





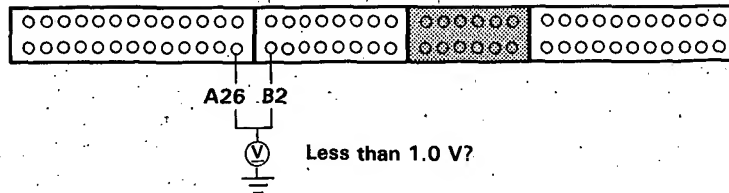
(cont'd)

# PGM-FI System

## Troubleshooting Flowchart — Engine Control Module (ECM) (cont'd)

(From page 11-51)

Measure voltage between body ground and the following terminals individually: •A26; •B2.



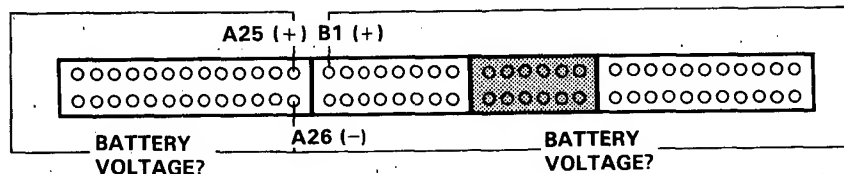
Is there less than 1.0 V?

NO

Repair open in BLK/RED (A26) or BRN/BLK (B2) and G101 (located at thermostat housing).

YES

Measure voltage between A26 (-) and the following: B1 (+) and A25 (+).



Is there battery voltage?

NO

- Repair open in YEL/BLK wire between ECM (A25, B1) and PGM-FI main relay.
- Check PGM-FI main relay and wiring connectors at PGM-FI main relay.


YES

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.



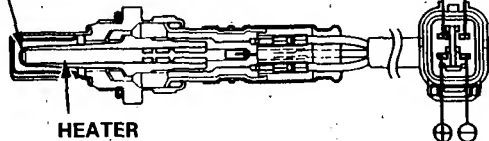
# PGM-FI System

## Troubleshooting Flowchart — Heated Oxygen Sensor (HO2S)

 **1** The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 1: A problem in the Heated Oxygen Sensor (HO2S) circuit.

The Heated Oxygen Sensor (HO2S) detects the oxygen content in the exhaust gas and signals the ECM. In operation, the ECM receives the signals from the sensor and varies the duration during which fuel is injected. The Heated Oxygen Sensor (HO2S) has an internal heater. The heater stabilizes the sensor's output. The Heated Oxygen Sensor (HO2S) is installed in exhaust pipe A.

ZIRCONIA  
ELEMENT



HEATER


SENSOR  
TERMINALS

HEATER  
TERMINALS

VOLTAGE (V)

STOICHIOMETRIC  
AIR-FUEL RATIO

RICH — AIR-  
FUEL  
RATIO — LEAN

 **1**

- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 1 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Warm up engine to normal operating temperature (the radiator fan comes on).

Run engine for 60 seconds.

Road test with the automatic transmission in **2** position (M/T: 4th gear). Starting at 1600 rpm, accelerate using wide open throttle for at least 5 seconds. Then decelerate for at least 5 seconds with the throttle completely closed.

\*B18A1 Engine

Is the MIL on and does it indicate code 1?

NO

YES


Go to page and perform test for code 43 (see page 11-60).

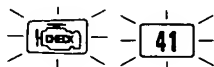
Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C216, C217 (located at right shock tower), \*C317 (located at left shock tower), C122 (HO2S) and ECM.



# PGM-FI System

## Troubleshooting Flowchart — Heated Oxygen Sensor Heater

 **41** The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 41: A problem in the Heated Oxygen Sensor (HO2S) Heater circuit.



- Engine is running.
- The MIL has been reported on. With service check connector jumped (see page 11-40), code 41 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Start the engine.

Is the MIL on and does it indicate code 41?

NO

YES

Turn the ignition switch OFF.

Disconnect the 4P connector from the HO2S.

Measure resistance between terminals C and D on the HO2S.

Is there 10–40  $\Omega$ ?

NO

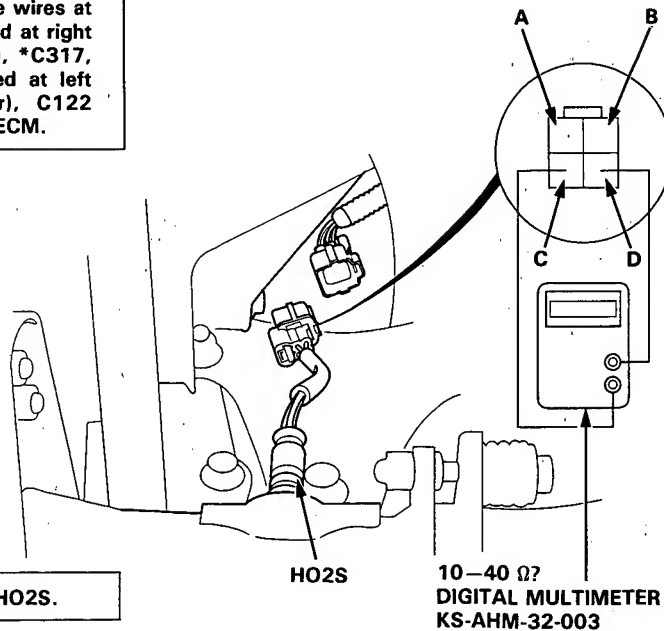
Replace the HO2S.

YES

(To page 11-57)

\*: B18A1 engine

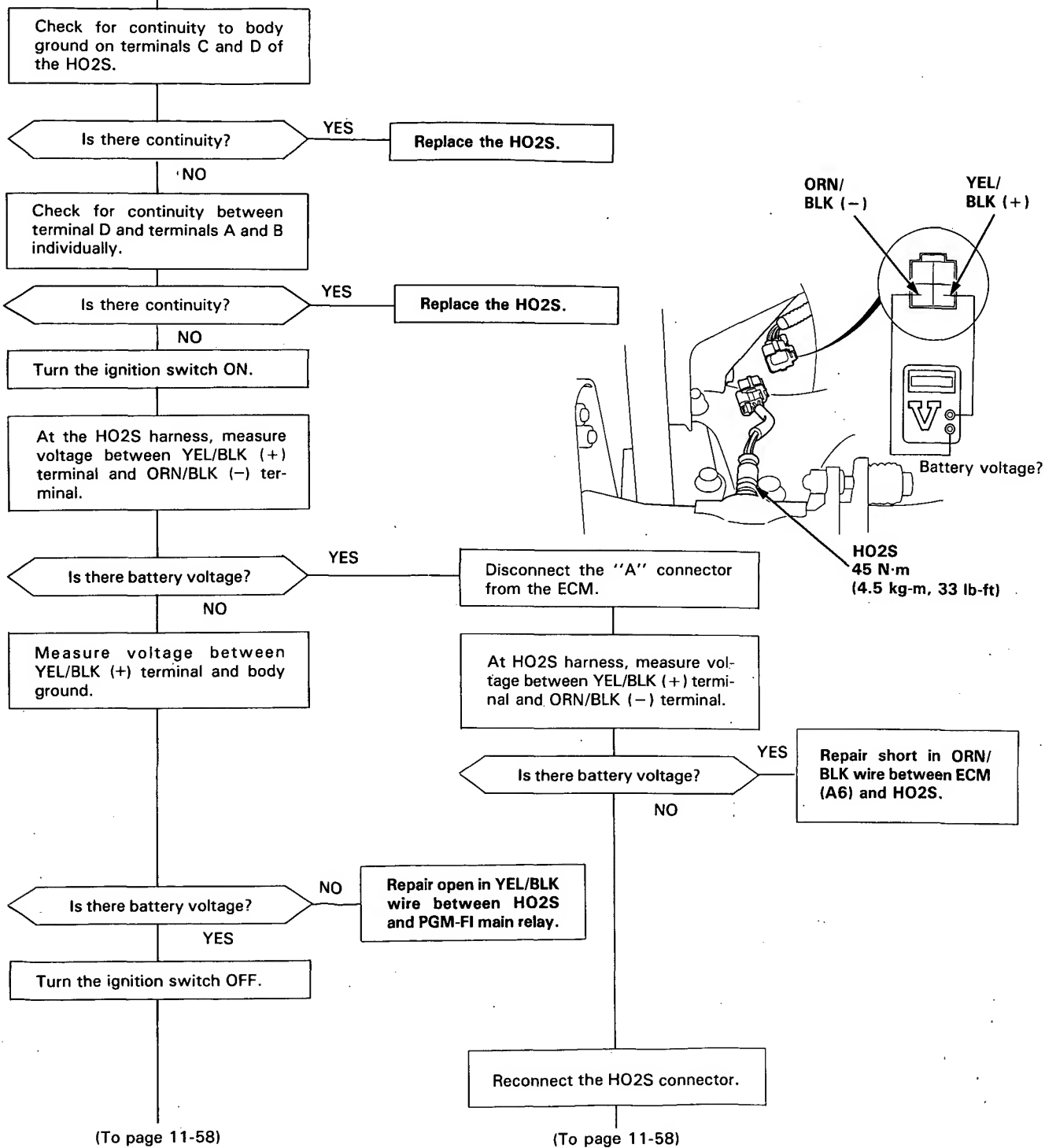
Intermittent failure, system is OK at this time (test drive may be necessary). Check for poor connections or loose wires at C216 (located at right shock tower), \*C317, C318 (located at left shock tower), C122 (HO2S) and ECM.







(From page 11-56)



(cont'd)

# PGM-FI System

## Troubleshooting Flowchart — Heated Oxygen Sensor Heater (cont'd)

(From page 11-57)

(From page 11-57)

Connect the test harness "A" connector to the main wire harness only, not the ECM (page 11-43).

Connect an ammeter between terminals A6 (+) and A26 (-).

\* Monitor over a 5 minutes period.

Replace the HO2S.

Is the current less than 0.1 A? \*

NO

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.

Reconnect the 4P connector to the HO2S.

Connect the test harness "A" connector to the main wire harness only, not the ECM (see page 11-43).

Turn the ignition switch ON.

Measure voltage between A6 (+) terminal and A23 (-) terminal.

Is there battery voltage?

YES

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.

BATTERY VOLTAGE?

A23 (-)

A6 (+)


NO


Repair open in ORN/BLK wire between ECM (A6) and HO2S.



# PGM-FI System

## Troubleshooting Flowchart — Fuel Supply System

 **43** The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 43: A problem in the Heated Oxygen Sensor (HO2S) circuit or a problem in the Fuel Supply System.

 **43**

- The MIL has been reprogrammed.
- With service check connector jumped (see page 11-40), code 43 is indicated.

Is the code 43 accompanied by the MIL and poor driveability?

YES

Go to Fuel Supply system (see page 11-105).

NO

Do the ECM Reset Procedure (see page 11-41).

Warm up engine to normal operating temperature (the radiator fan comes on).

Hold engine at 3,000 rpm for two minutes.  
(A/T: Transmission in **N** or **P** position.)

Is the MIL on and does it indicate code 43?

NO

YES

Turn the ignition switch OFF.

Connect the test harness between the ECM and connectors (see page 11-43).

With the ignition switch OFF, wait for at least two minutes.

Install a jumper wire on the test harness between A6 and A26.

Turn the ignition switch ON.

Measure voltage between D14 (+) terminal and A26 (–) terminal as soon as the ignition switch is turned on.

(To page 11-61)

From code 1 troubleshooting (page 11-54).

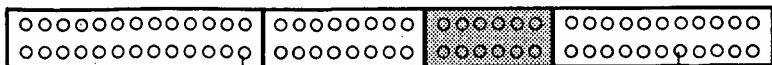
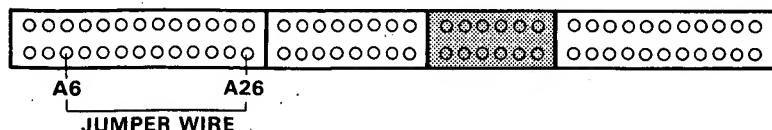
\*: B17A1 engine  
\*\*: B18A1 engine

Intermittent failure, system is OK at this time (test drive may be necessary).

Check for poor connections or loose wire at C216, \*C217 (located at right shock tower), \*\*C317, C318 (located at left shock tower), C122 (HO2S) and ECM.

### NOTE:

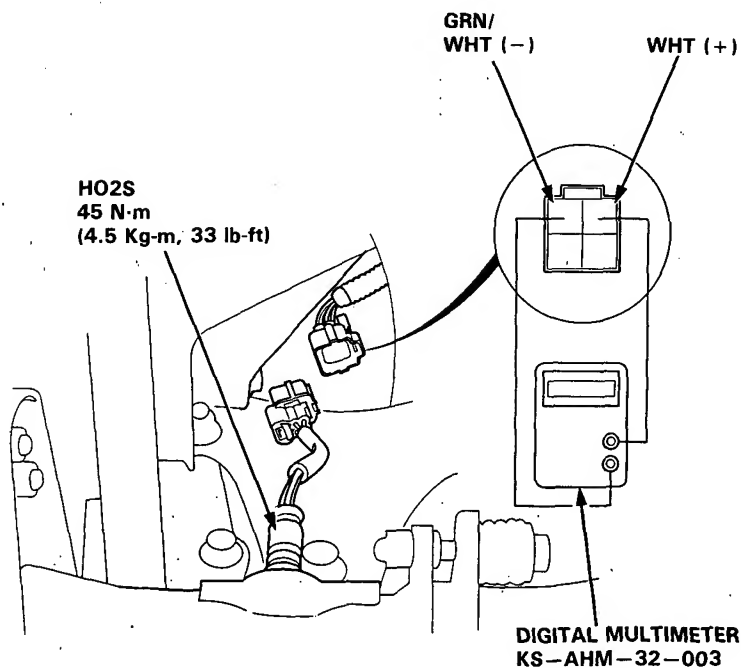
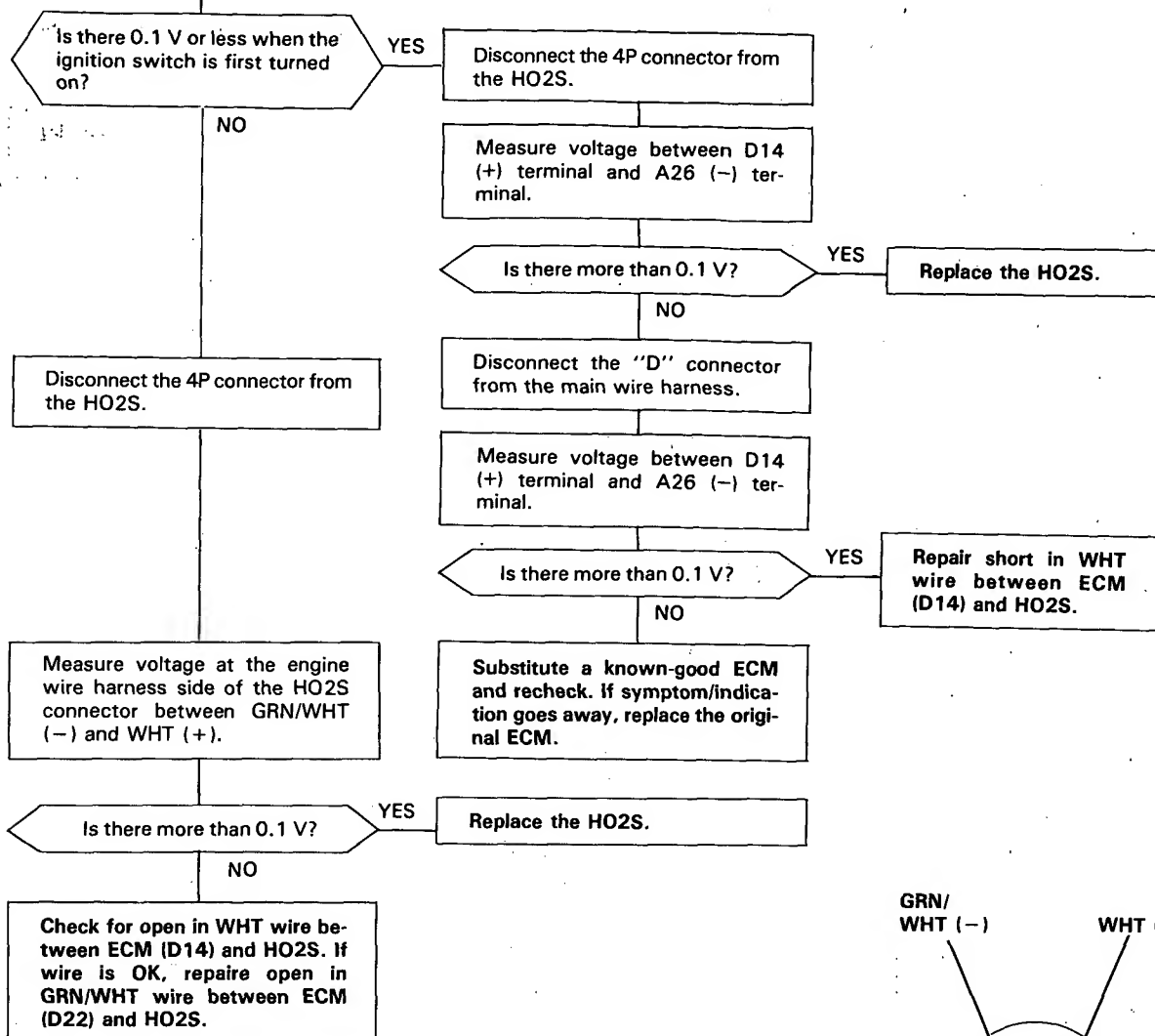
- Use DIGITAL MULTIMETER.
- Use 2 Volt range.



A26 (–) Voltage should start at 0.4–0.5 V when the ignition switch is first turned on, and decrease to below 0.1 V in less than two minutes. D14 (+)





(From page 11-60)



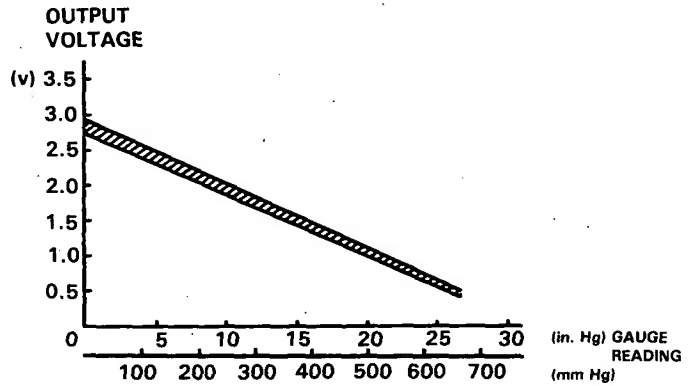
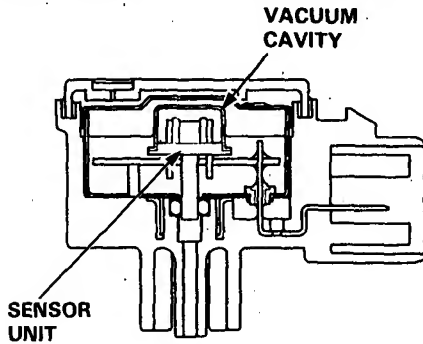
# PGM-FI System

## Troubleshooting Flowchart — Manifold Absolute Pressure (MAP) Sensor —

 **3** — The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 3: An electrical problem in the Manifold Absolute Pressure (MAP) Sensor system.

 **5** — The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 5: A mechanical problem (vacuum leak) in the Manifold Absolute Pressure (MAP) Sensor system.

The MAP sensor converts manifold absolute pressure into electrical signals and inputs the ECM.



 **3**

- Engine is warm and running.
- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 3 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Start the engine and allow it to idle.

Is the MIL on and does it indicate code 3? **NO**

**YES**

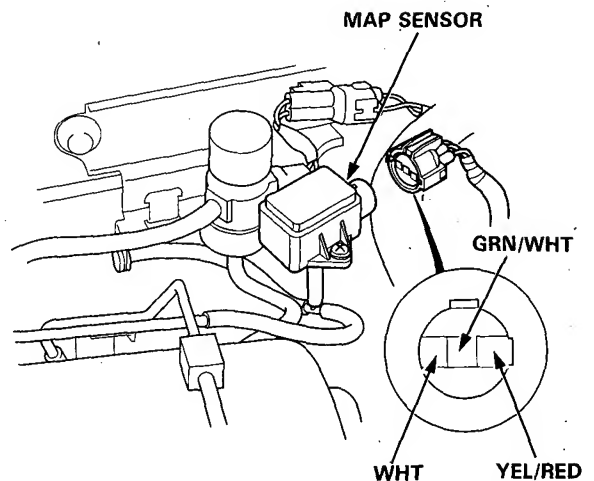
Turn the ignition switch OFF.

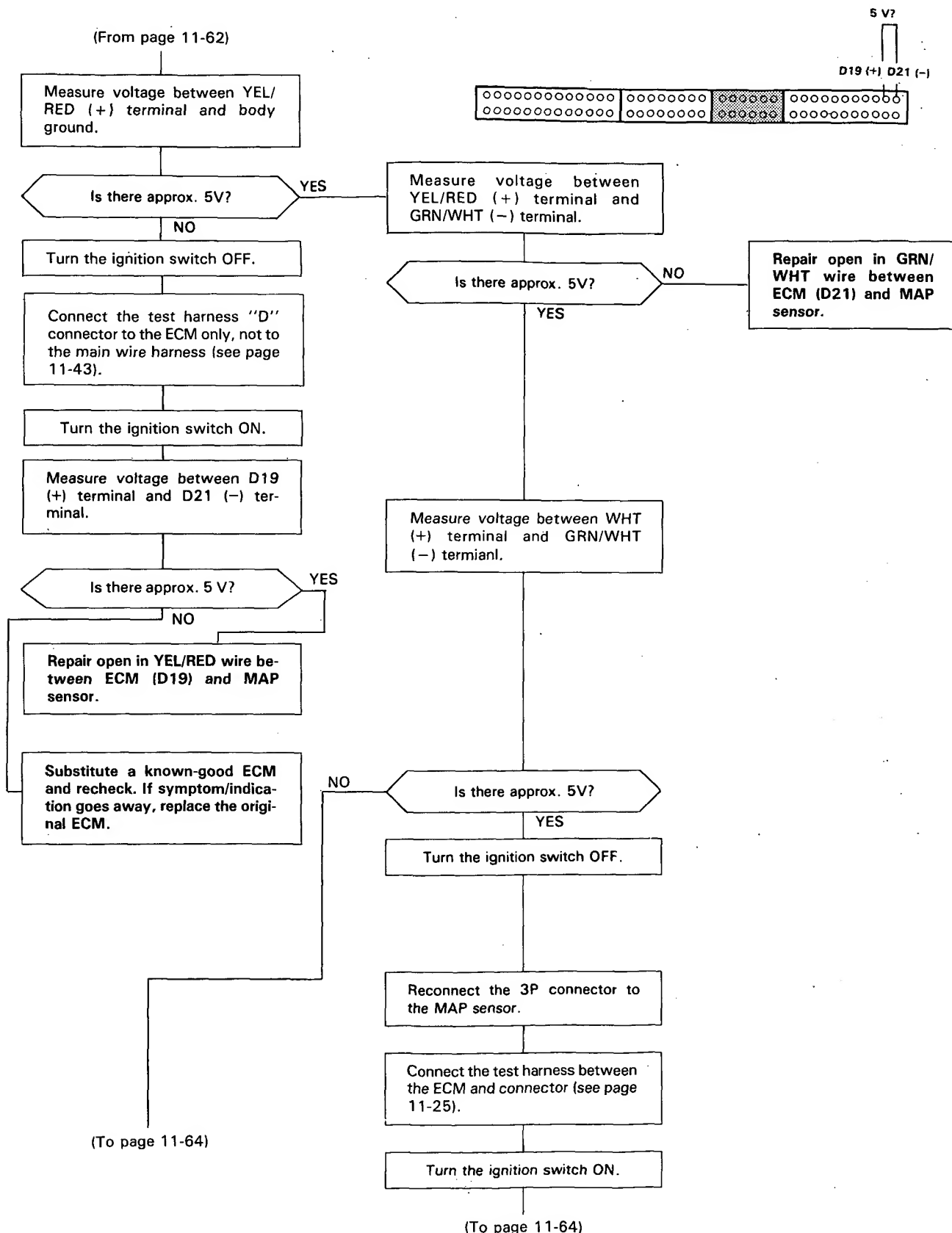
Disconnect the 3P connector from the MAP sensor.

Turn the ignition switch ON.

(To page 11-63)

Intermittent failure, system is OK at this time (test drive may be necessary). Check for poor connection or loose wires at C312 (MAP sensor) and ECM.





(cont'd)

# PGM-FI System

## Troubleshooting Flowchart — Manifold Absolute Pressure (MAP) Sensor (cont'd)

(From page 11-63)

(From page 11-63)

Measure voltage between D17 (+) terminal and D21 (-) terminal.

Turn the ignition switch OFF.

Connect the test harness 'D' connector to the ECM only, not to the main wire harness (see page 11-43).

Turn the ignition switch ON.

Measure voltage between D17 (+) terminal and D21 (-) terminal.

Is there approx. 3 V?

NO

Replace the MAP sensor.

YES

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.

Is there approx. 5 V?

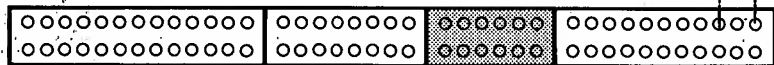
YES

- Repair short in WHT wire between ECM (D17) and MAP sensor.
- Repair open in WHT wire between ECM (D17) and MAP sensor.

NO

Substitute a known-good ECM and recheck. If prescribed voltage is now available, replace the original ECM.

3 V ?  
D17 (+) D21 (-)



(cont'd)





# PGM-FI System

## Troubleshooting Flowchart—Manifold Absolute Pressure (MAP) Sensor (cont'd)



5

- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 5 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Start the engine and keep engine speed at 2000 rpm for one minute with manual transmission in neutral (A/T: **P** or **N** position).

Is the MIL on and does it indicate code 5?

NO

YES

Turn the ignition switch OFF.

Disconnect #21 hose from the throttle body, connect vacuum pump to the hose and apply vacuum.

Does it hold vacuum?

NO

YES

Connect a T-fitting from a vacuum gauge, between the throttle body base and #21 hose.

- Intermittent failure, system is OK at this time (test drive may be necessary).
- Check vacuum hoses, pipes and connections.
- Make sure all connectors are secure.

#21 HOSE

VACUUM PUMP/GAUGE  
A973X-041-XXXXX

MAP SENSOR

Connect a vacuum pump to the MAP sensor and apply vacuum.

Does it hold vacuum?

NO

Replace the MAP sensor.

YES

Repair vacuum leak in hose routing between MAP sensor and intake manifold.

(From page 11-67)



(From page 11-66)

Start the engine.

Is there manifold vacuum?

NO

Remove restriction from throttle body.

YES

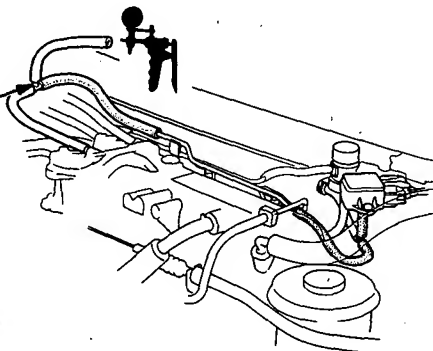
Turn the ignition switch OFF.

Connect the test harness between the ECM and connector (see page 11-43).

Turn the ignition switch ON.

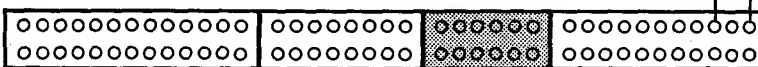
Measure voltage between D17 (+) terminal and D21 (-) terminal.

T-FITTING



3 V ?

D17 (+) D21 (-)



Is there approx. 3 V ?

NO

Replace the MAP sensor.

YES

Start the engine and allow it to idle.

Is there approx. 1 V ?

NO




Replace the MAP sensor.

YES

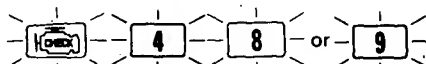
Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.

# PGM-FI System

## Troubleshooting Flowchart — TDC/CKP/CYP Sensor

-  **4** The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 4: A problem in the Crankshaft Position (CKP) Sensor circuit.
-  **8** The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 8: A problem in the Top Dead Center (TDC) Sensor circuit.
-  **9** The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 9: A problem in the Cylinder Position (CYP) Sensor circuit.

The CKP Sensor determines timing for fuel injection and ignition of each cylinder and also detects engine speed. The TDC Sensor determines ignition timing at start-up (cranking) and when crank angle is abnormal. The CYP Sensor detects the position of No. 1 cylinder for sequential fuel injection to each cylinder.



- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 4, 8 and/or 9 are indicated.

Do the ECM Reset procedure (see page 11-41).

Start the engine.

Is the MIL on and does it indicate code 4, 8 and/or 9?

NO

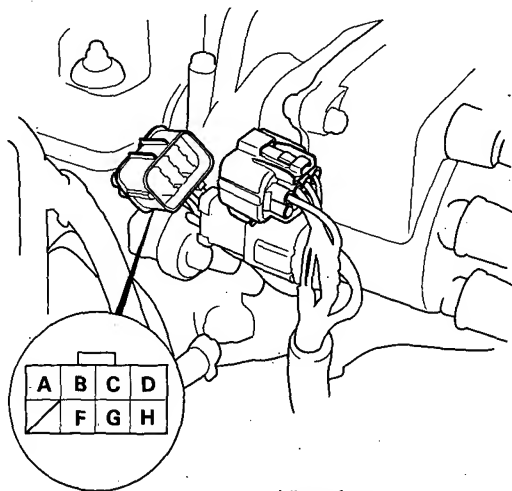
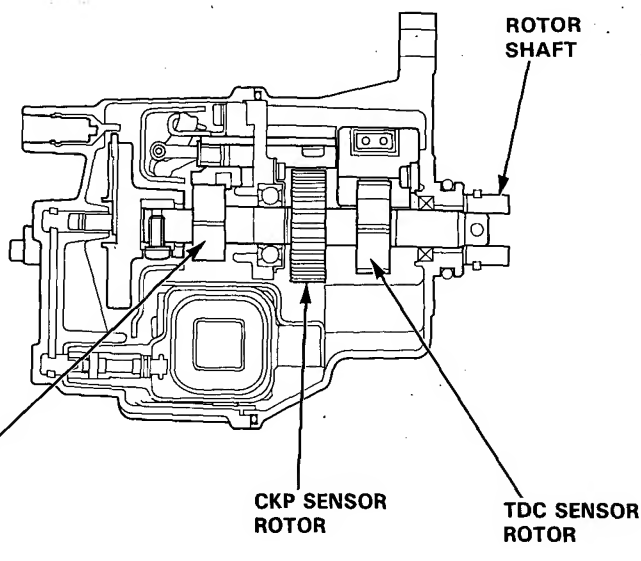
YES

Turn the ignition switch OFF.

Disconnect the 8P connector from the TDC/CKP/CYP sensor.

(To page 11-69)

Intermittent failure, system is OK at this time (test drive may be necessary).  
Check for poor connections or loose wires at C216 (located at right shock tower), C115 (TDC/CKP/CYP Sensor) and ECM.



View from Terminal side



(From page 11-68)

Measure resistance between terminals of the indicated sensor.  
\*see table

Is there 350–700Ω?

NO

Replace the distributor sub-assembly (see section 23).

YES

Check for continuity to body ground on both terminals of the indicated sensor.

Is there continuity?

YES

Replace the distributor sub-assembly (see section 23).

NO

Reconnect the connector.

Connect the test harness to the main wire harness only, not to the ECM (see page 11-43).

Measure resistance between terminals of the indicated sensor on test harness.  
\*see table

Is there 350–700Ω?

NO

Repair open in the indicated sensor wires.  
\*see table

YES

Check for continuity to body ground on B15, B13 and/or B11 terminals.

Is there continuity?

YES

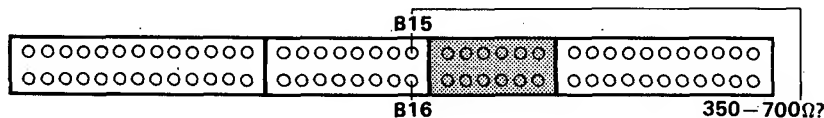
Repair short to body ground in the indicated sensor wires.  
\*see table

NO

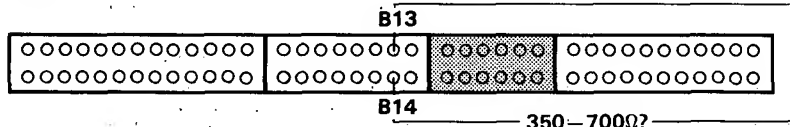
Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.

SENSOR	DTC	SENSOR TERMINAL	ECM TERMINAL	WIRE COLOR
CKP	4	B	B15	BLU/GRN
		F	B16	BLU/YEL
TDC	8	C	B13	ORN/BLU
		G	B14	WHT/BLU
CYP	9	D	B11	ORN
		H	B12	WHT

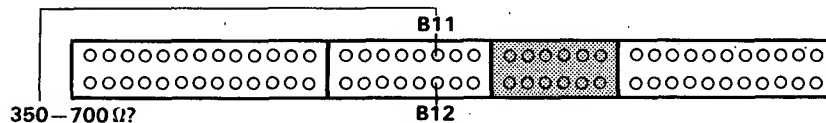
CKP:



TDC:

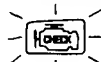


CYP:



# PGM-FI System

## Troubleshooting Flowchart — Engine Coolant Temperature (ECT) Sensor

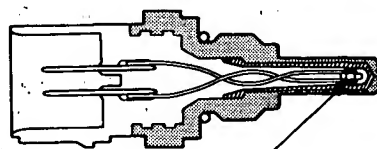


6

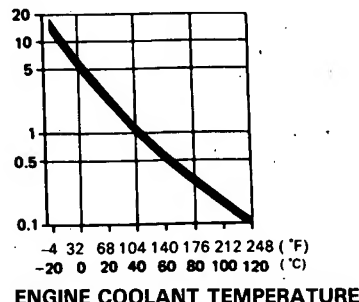
The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 6: A problem in the Engine Coolant Temperature (ECT) Sensor circuit.

The ECT Sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the engine coolant temperature increases as shown below.

RESISTANCE  
(k $\Omega$ )



THERMISTOR



6

- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 6 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Turn the ignition switch ON.

Is the MIL on and does it indicate code 6?

NO

YES

Warm up engine to normal operating temperature (the radiator fan comes on).

Turn the ignition switch OFF.

Disconnect the 2P connector from the ECT sensor.

Measure resistance between the 2 terminals on the ECT sensor.

Is there 200—400  $\Omega$ ?

NO

Replace the ECT sensor.

YES

(To page 11-71)

\*: B18A1 engine

Intermittent failure, system is OK at this time (test drive may be necessary).  
Check for poor connections or loose wires at C216, C217 (located at right shock tower), \*C317, \*C318 (located at left shock tower), C117 (ECT sensor), C424 (TCM) and ECM.



(From page 11-70)

Turn the ignition switch ON.

Measure voltage between RED/  
WHT and body ground.

Is there approx. 5V ?

YES

Measure voltage between RED/  
WHT (+) terminal and GRN/WHT  
(-) terminal.

NO

Turn the ignition switch OFF.

A/T only

Disconnect the 18P connector  
from the Transmission Control  
Module (TCM).

Turn the ignition switch ON.

Is there approx. 5 V?

YES

Replace the TCM.

NO

Turn the ignition switch OFF and  
reconnect the connector to the  
TCM.

Connect the test harness "D"  
connector to the ECM only, not to  
the main wire harness (see page  
11-43).

Turn the ignition switch ON.

Measure voltage between D13  
(+) terminal and D22 (-) ter-  
minal.

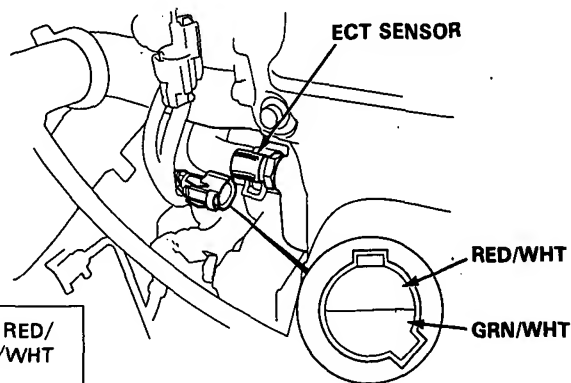
Is there approx. 5V?

YES

Repair open or short in RED/WHT  
wire between ECM (D13) and  
ECT sensor.

NO

Substitute a known-good ECM  
and recheck. If symptom/indica-  
tion goes away, replace the origi-  
nal ECM.



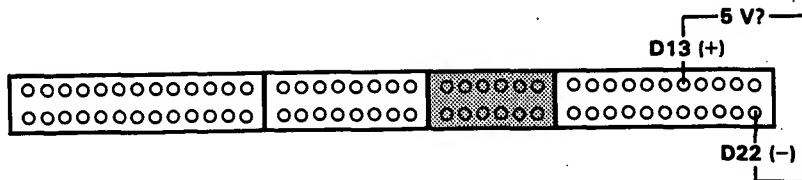
Is there approx. 5V ?

NO

Repair open in GRN/  
WHT wire between  
ECM (D22) and ECT  
sensor.

YES

Substitute a known-good ECM  
and recheck. If symptom/indica-  
tion goes away, replace the origi-  
nal ECM.



# PGM-FI System

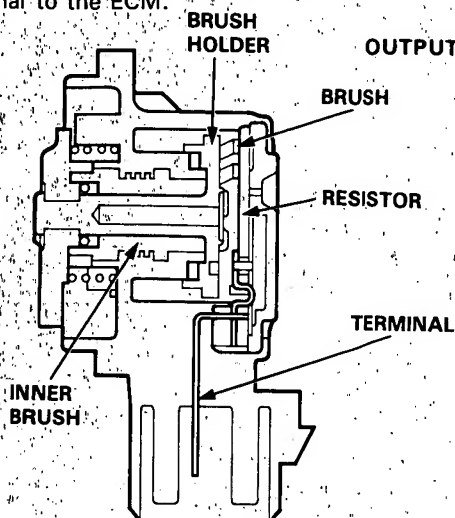
## Troubleshooting Flowchart — Throttle Position (TP) Sensor



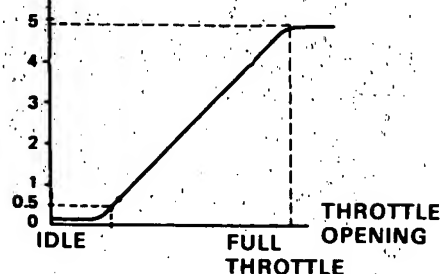
7

The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 7: A problem in the Throttle Position (TP) Sensor circuit.

The TP Sensor is a potentiometer. It is connected to the throttle valve shaft. As the throttle position changes, the throttle position sensor varies the voltage signal to the ECM.



OUTPUT VOLTAGE (V)



7

- Engine is running.
- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 7 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Start the engine.

Is the MIL on and does it indicate code 7?

NO

YES

Turn the ignition switch OFF.

Disconnect the 3P connector from the TP sensor.

Turn the ignition switch ON.

Measure voltage between YEL/WHT (+) terminal and GRN/WHT (-) terminal.

Is there approx. 5V?

NO

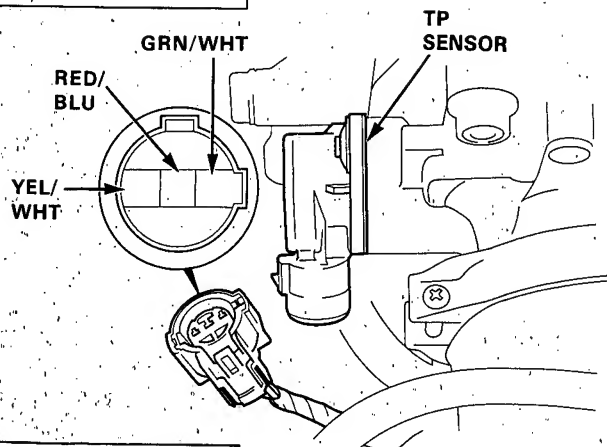
YES

(To page 11-73)

\*: B18A1 engine

Intermittent failure, system is OK at this time (test drive may be necessary).

Check for poor connections or loose wires at \*C216, C217 (located at right shock tower) \*C317, C318 (located at left shock tower), C106 (TP sensor), C424 (TCM) and ECM.



Measure voltage between YEL/WHT (+) terminal and body ground.

(To page 11-73)





(From page 11-72)

Turn the ignition switch OFF.

Reconnect the 3P connector.

Connect the test harness between the ECM and connector (see page 11-43).

Turn the ignition switch ON.

Measure voltage between D11(+) terminal and D22 (-) terminal.

Is voltage 0.5 V at full close throttle, and approx. 4.5 V at full open throttle?  
NOTE: There should be a smooth transition from 0.5 V to approx. 4.5 V as the throttle is depressed.

YES

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.

NO

A/T only

Disconnect the 18P connector from the Transmission Control Module (TCM).

Is voltage 0.5 V at full close throttle, and 4.5 V at full open throttle?  
NOTE: There should be a smooth transition from 0.5 V to 4.5 V as the throttle is depressed.

YES

Replace the TCM.

NO

- Replace the TP sensor.
- Repair open or short in RED/BLU wire between ECM (D11), TCM and TP sensor.

(From page 11-72)

Is there approx. 5V ?

YES

Repair open in GRN/WHT wire between ECM (D22) and TP sensor.

NO

Turn the ignition switch OFF.

Connect the test harness between the ECM and connector (see page 11-43).

Turn the ignition switch ON.

Measure voltage between D20 (+) terminal and D22 (-) terminal.

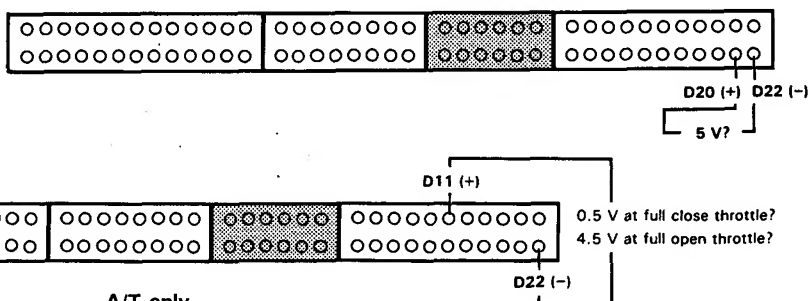
Is there approx. 5V ?

YES

Repair open in YEL/WHT wire between ECM (D20) and TP sensor.

NO

Substitute a known-good ECM and recheck. If prescribed voltage is now available, replace the original ECM.



# PGM-FI System

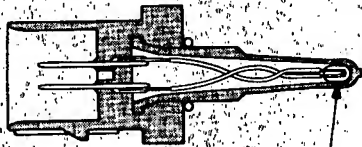
## Troubleshooting Flowchart — Intake Air Temperature (IAT) Sensor



10

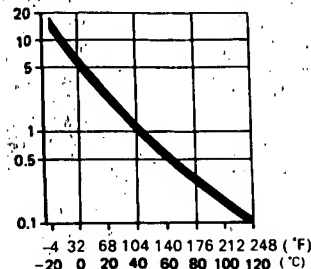
The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 10: A problem in the Intake Air Temperature (IAT) Sensor circuit.

The IAT Sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the intake air temperature increases as shown below.



THERMISTOR

RESISTANCE (kΩ)



INTAKE AIR TEMPERATURE



10

- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 10 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Turn the ignition switch ON.

Is the MIL on and does it indicate code 10?

NO

YES

Turn the ignition switch OFF.

Disconnect the 2P connector from the IAT sensor.

Measure resistance between the 2 terminals on the IAT sensor.

Is there 0.4 — 4.0 kΩ?

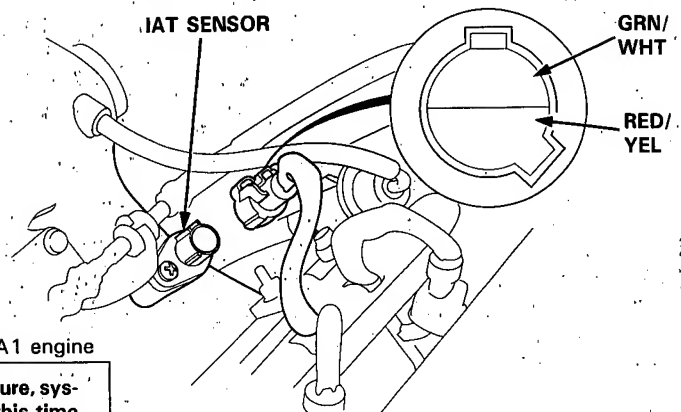
NO

YES

Replace the IAT sensor.

(To page 11-75)

IAT SENSOR



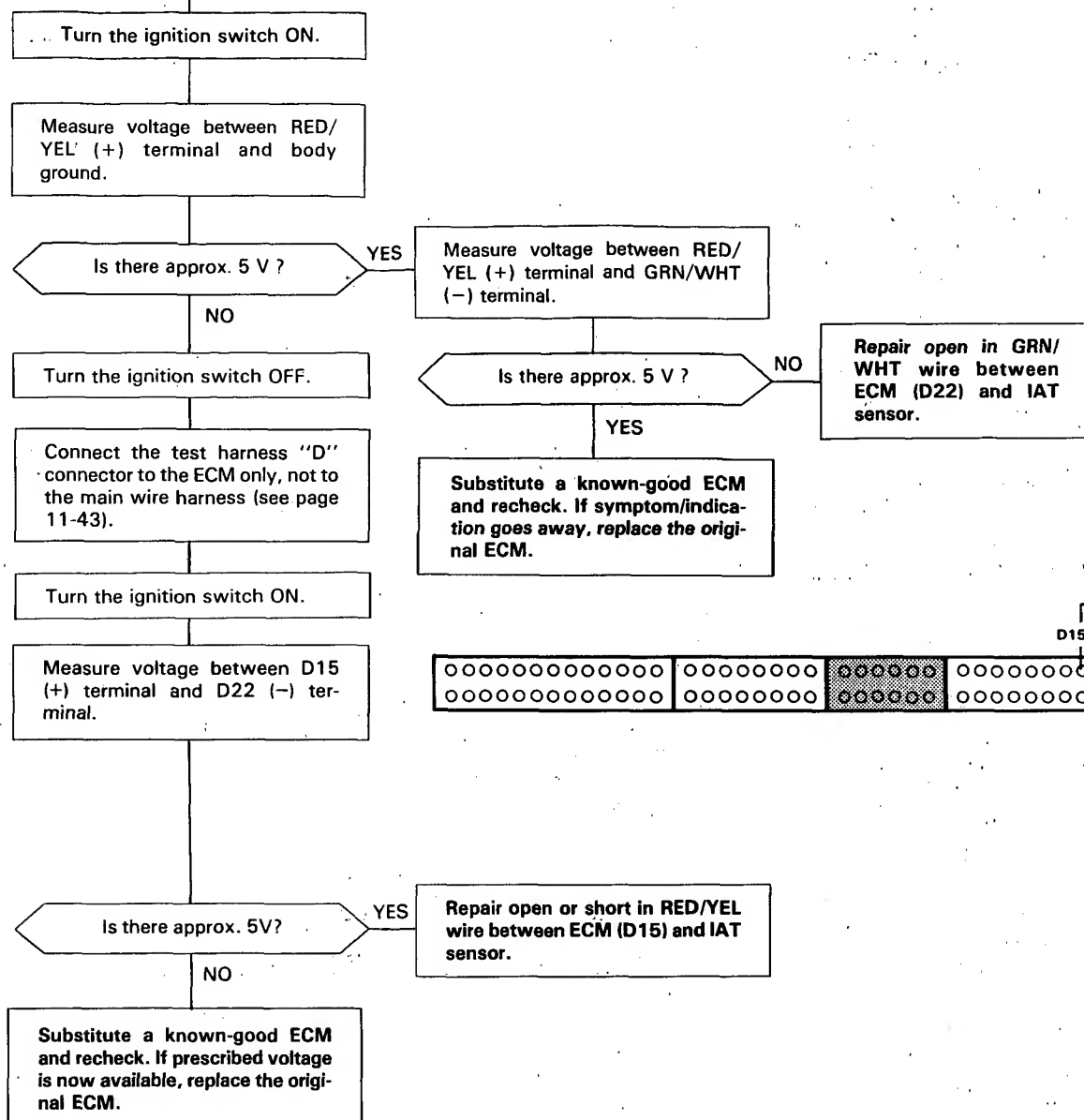
\*: B18A1 engine

Intermittent failure, system is OK at this time (test drive may be necessary).

Check for poor connections or loose wires at C217 (located right shock tower), \*C317, C318 (located at left shock tower), C111 (IAT sensor) and ECM.




(From page 11-74)




# PGM-FI System

## Troubleshooting Flowchart — Barometric Pressure (BARO) Sensor

 **13** The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 13: A problem in the Barometric Pressure (BARO) Sensor.

The BARO Sensor is built into the ECM.

 **13**

- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 13 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Turn the ignition switch ON.

Is the MIL on and does it indicate code 13?

NO

Intermittent failure, system is OK at this time (test drive may be necessary).  
A/T: Check for poor connections or loose wires at C424 (TCM) and ECM.

YES

(A/T)

Turn the ignition switch OFF.

Connect the test harness to the main wire harness only, not the ECM (see page 11-43).

Disconnect the 18P connector from the Transmission Control Module (TCM).

Check for continuity between D8 terminal and body ground.

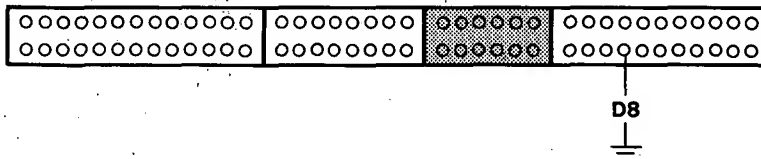
NO

YES

Is there continuity?

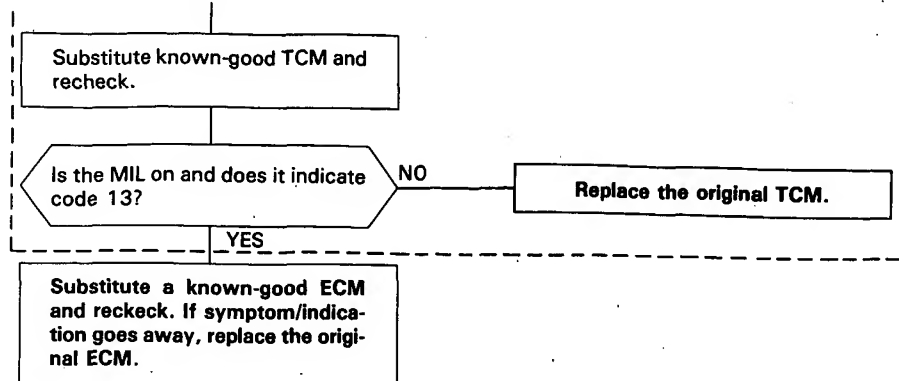
Repair short in RED/WHT wire between ECM (D8) and the TCM.

(To page 11-77)





(From page 11-76)



# PGM-FI System

## Troubleshooting Flowchart — Ignition Output Signal

**15**

The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 15: A problem in the Ignition Output Signal circuit.

- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 15 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Start the engine.

NOTE: If the engine won't start, it may take 20 seconds of cranking to set the code.

Is the MIL on and does it indicate code 15?

NO

Intermittent failure system is OK at this time (test drive may be necessary).  
Check for poor connections or loose wires at C216 (located at right shock tower), C155 (ICM) and ECM.

YES

Turn the ignition switch OFF.

Disconnect the 2P connector from the distributor.

Turn the ignition switch ON.

Measure voltage between BLK / YEL (+) terminal and body ground.

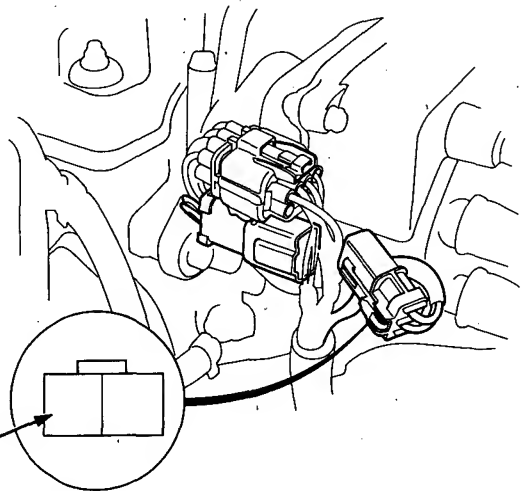
Is there battery voltage?

NO

Repair open in BLK/YEL wire between the 2P connector and ignition switch.

YES

(To page 11-79)



BLK/  
YEL(+)



(From page 11-78)

Turn the ignition switch OFF.

Reconnect the 2P connector.

Connect the test harness between the ECM and connector (see page 11-43).

Turn the ignition switch ON.

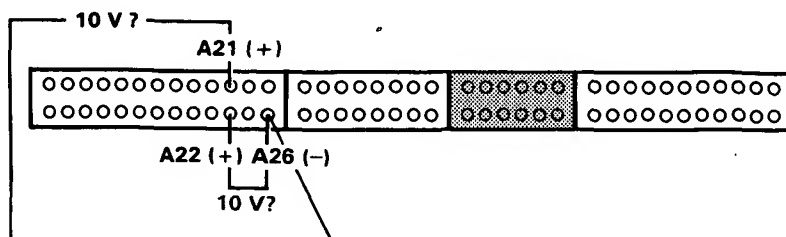
Measure voltage individually between A21 (+), A22 (+) terminals and A26 (-) terminal.

Is there approx. 10 V?

NO

YES

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.



- Replace the ICM.
- Repair open or short in YEL/GRN wire between ICM and ECM (A21 or A22).

NOTE: If the YEL/GRN wire was shorted, the ICM may be damaged.

# PGM-FI System

## Troubleshooting Flowchart — Vehicle Speed Sensor (VSS)

 **17** The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 41: A problem in the Vehicle Speed Sensor (VSS) circuit.

The VSS generates a pulsing signal when the front wheels turn.

- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 17 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Road test necessary.  
With manual transmission in 2nd gear (A/T: in **2** position) accelerate to 4,000 rpm, then decelerate to 1,500 rpm with throttle fully closed.

Is the MIL on and does it indicate code 17?

NO

Intermittent failure system is OK at this time.

Check for poor connections or loose wires at C401 (located at left side under dash), C404, C704 (fuse box), C711, C714 (gauge assembly) and ECM.

YES

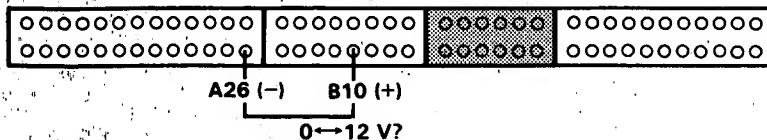
Block rear wheels and set the parking brake. Jack up the front of the car and support with safety stands.

**⚠ WARNING** Block rear wheels before jacking up front of car.

Connect the test harness between the ECM and connectors (see page 11-43).

Turn the ignition switch ON.

Block the right front wheel and slowly rotate left front wheel and measure voltage between B10 (+) terminal and A26 (-) terminal.



NOTE: Transmission in **N** position (A/T).

Does voltage pulse 0 V and 12 V?

NO

Turn the ignition switch OFF.

(To page 11-81)

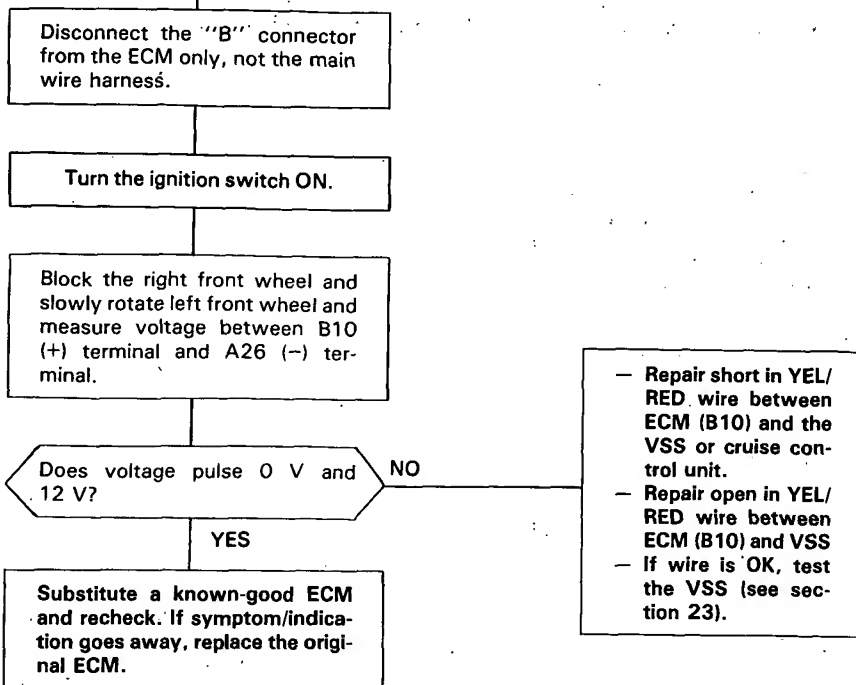
YES

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.





(From page 11-80)



# PGM-FI System

## Troubleshooting Flowchart — Knock Sensor (KS) [B17A1 engine]



**23**

The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 23: A problem in the Knock Sensor (KS) circuit.



**23**

- MIL has been reported on.
- With service check connector jumped (see page 11-40), code 23 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Warm up the engine to normal operating temperature (the radiator fan comes on).

Hold engine at 3000—4000 rpm for 10 seconds.

Is the MIL on and does it indicate code 23?

NO

YES

Turn the ignition switch OFF.

Connect the test harness to the main wire harness only, not to the ECM (see page 11-43).

Disconnect the C216 connector.

Check for continuity between D3 terminal and body ground.

Is there continuity?

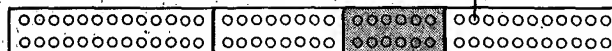
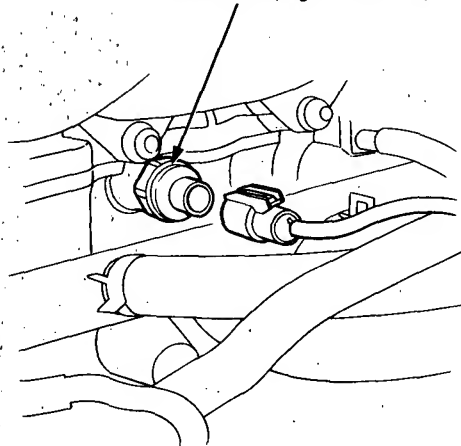
YES

Repair short in RED/BLU wire between ECM (D3) and the KS.

NO

(To page 11-83)

**KNOCK SENSOR (KS)**  
32 N·m (3.2 kg-m, 23 lb-ft)



D3

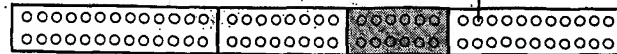




(From page 11-82)

D3

Check for continuity on RED/BLU wire between D3 terminal and KS.



Is there continuity?

NO

Repair open in RED/BLU wire between ECM (D3) and KS.

YES

Substitute a known-good ECM and recheck.

Reconnect the C216 connector.

Warm up the engine to normal operating temperature (the radiator fan comes on).

Reconnect the C216 connector

Hold engine at 3,000—4,000 rpm for 10 seconds.

Is the MIL on and does it indicate code 23?

NO

Replace the original ECM

YES

Replace the KS and recheck.

# Idle Control System

## System Troubleshooting Guide

### NOTE:

- Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected, starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next system ②, etc.
- If the idle speed is out of specification and the Malfunction Indicator Lamp (MIL) does not blink Diagnostic Trouble Code (DTC) 14, go to inspection described on page 11-87.

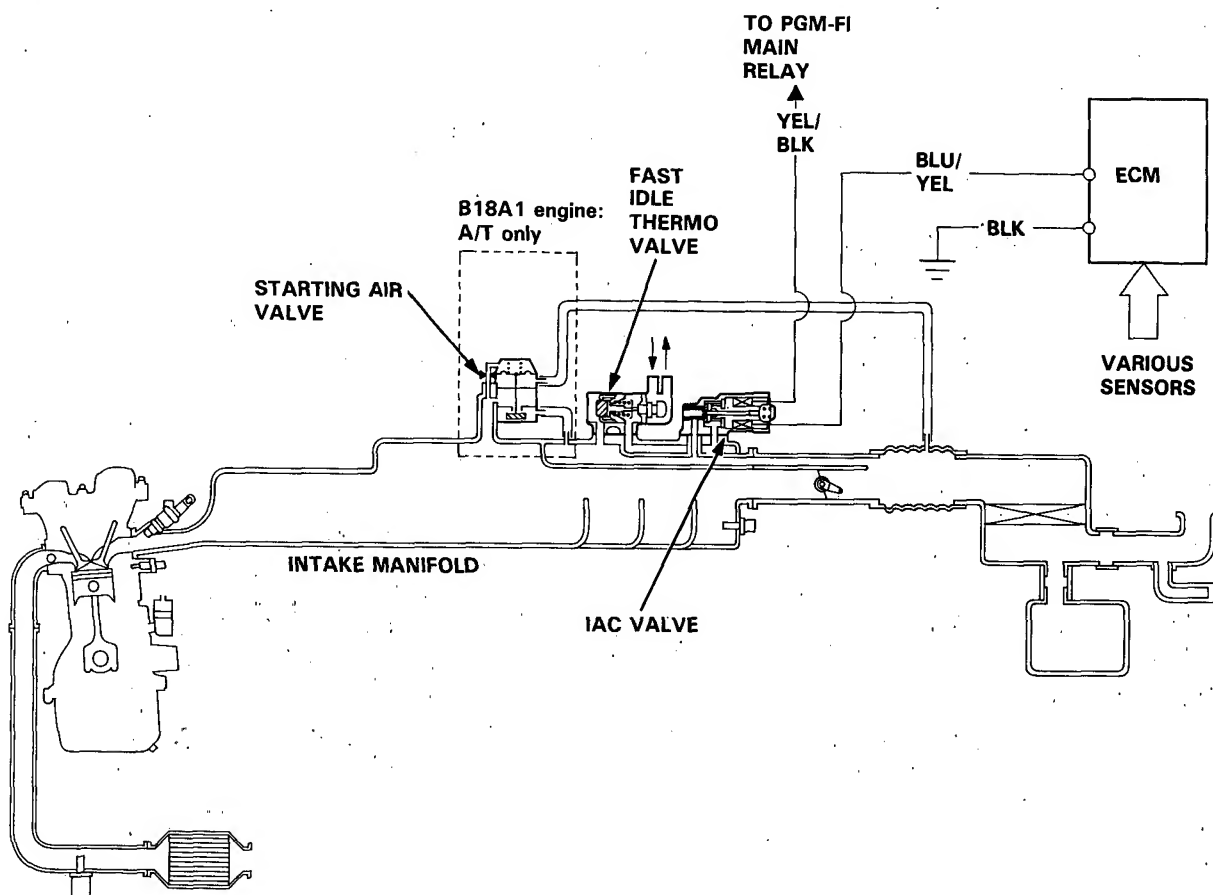
PAGE	SUB-SYSTEM	IDLE ADJUSTING SCREW	IDLE AIR CONTROL VALVE	AIR CONDITIONING SIGNAL	ALTERNATOR FR SIGNAL	AUTOMATIC TRANS-AXLE GEAR POSITION SWITCH	STARTER SWITCH SIGNAL	BRAKE SWITCH SIGNAL	POWER STEERING PRES-SURE SWITCH	FAST IDLE THERMO VALVE	*START-ING AIR VALVE	HOSES AND CONNE-CTIONS
	SYMPTOM	103	88	90	92	94	96	98	100	101	102	—
	DIFFICULT TO START ENGINE WHEN COLD									①	②	
	WHEN COLD FAST IDLE OUT OF SPEC (1,000—2,000 rpm)	③	②							①		
	ROUGH IDLE		②									①
	WHEN WARM RPM TOO HIGH	③	①						③	②		③
WHEN WARM RPM TOO LOW	Idle speed is below specified rpm (no load)	②	①									
	Idle speed does not increase after initial start up.		①									
	On models with automatic transmission, the idle speed drops in gear		②			①						
	Idle speeds drops when air conditioner in ON		②	①								
	Idle speed drops when steering wheel is turning		②						①			
	Idle speed fluctuates with electrical load		②		③							①
FREQUENT STALLING	WHILE WARMING UP	②	①									
	AFTER WARMING UP	①	②									
	FAILS EMISSION TEST											①

\*: B18A1 engine (A/T)



## System Description

The idle speed of the engine is controlled by the Idle Air Control (IAC) Valve. The valve changes the amount of air bypassing into the intake manifold in response to electric current controlled by the ECM. When the IAC Valve is activated, the valve opens to maintain the proper idle speed.

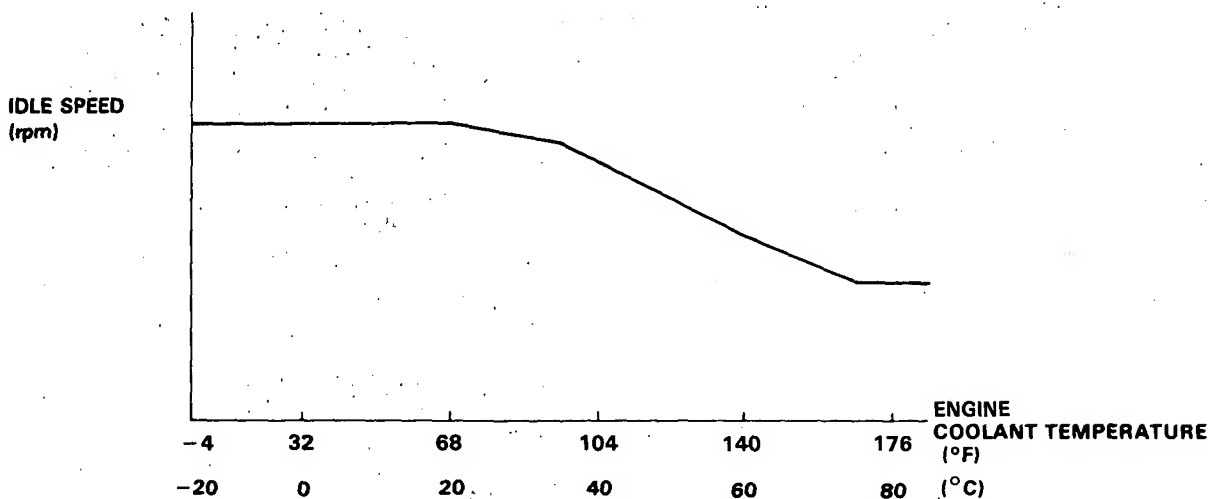


(cont'd)

# Idle Control System

## System Description (cont'd)

1. After the engine starts, the IAC valve opens for a certain time. The amount of air is increased to raise the idle speed about 150 - 300 rpm.
2. When the coolant temperature is low, the IAC valve is opened to obtain the proper fast idle speed. The amount of bypassed air is thus controlled in relation to the engine coolant temperature.





1. When the idle speed is out of specification and the Malfunction Indicator Lamp (MIL) does not blink Diagnostic Trouble Code (DTC) 14, check the following items:
  - Adjust the idle speed (see page 11-103)
  - Air conditioning signal (see page 11-90)
  - ALT FR signal (see page 11-92)
  - A/T gear position signal (see page 11-94)
  - Starter switch signal (see page 11-96)
  - Brake switch signal (see page 11-98)
  - PSP switch signal (see page 11-100)
  - Fast idle thermo valve (see page 11-101)
  - \*Starting air valve (see page 11-102)
  - Hoses and connections
  - IAC valve and its mounting O-rings

\*: B18A1 engine (A/T)
2. If the above items are normal, substitute a known-good IAC valve and readjust the idle speed (see page 11-103).
  - If the idle speed still cannot be adjusted to specification (and the MIL does not blink code 14) after IAC valve replacement, substitute a known-good ECM and recheck. If symptom goes away, replace the original ECM.

# Idle Control System

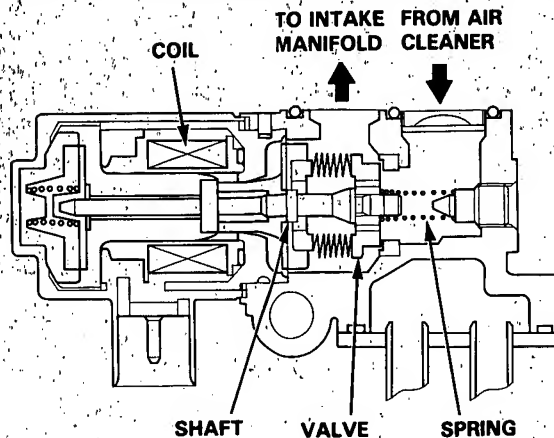
## Troubleshooting Flowchart — Idle Air Control (IAC) Valve



**14**

The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 14: A problem in the Idle Air Control (IAC) Valve circuit.

The IAC Valve changes the amount of air bypassing the throttle body in response to a current signal from the ECM in order to maintain the proper idle speed.



**14**

- The MIL has been reported on.
- With service check connector jumpered (see page 11-40), code 14 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Start the engine.

Is the MIL on and does it indicate code 14?

YES

Remove the 2P connector from the IAC valve.

NO

With the engine running and the accelerator pedal released, disconnect the 2P connector from the IAC valve.

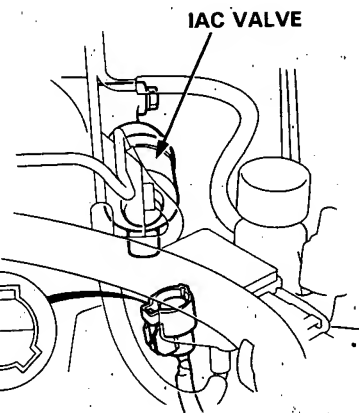
Is there a reduction in engine rpm?

NO

Substitute a known-good IAC valve and retest.

YES

Intermittent failure, system is OK at this time (test driving may be necessary). Check for poor connection or loose wires at C318 (located at left shock tower), C123 (IAC valve) and ECM.



(To page 11-89)





(From page 11-88)

Measure voltage between the YEL/BLK wire and body ground.

Is there battery voltage?

NO

Repair open in YEL/BLK wire between IAC valve and PGM-FI main relay.

YES

Turn the ignition switch off and reconnect the 2P connector to the IAC valve.

Connect the test harness "A" connector to the main wire harness only, not the ECM (see page 11-43).

Turn the ignition switch ON.

Momentarily connect A9 terminal to A23 terminal several times.

Does the IAC valve click?

YES

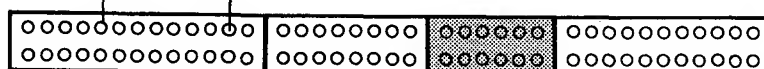
Substitute a known-good ECM and retest. If symptom/indication goes away, replace the original ECM.

NO

Repair open or short in BLU/YEL wire between IAC valve and ECM (A9). If the wire is OK, replace the IAC valve.

#### JUMPER WIRE

A9 (+) A23 (-)



# Idle Control System

## Troubleshooting Flowchart — Air Conditioning Signal

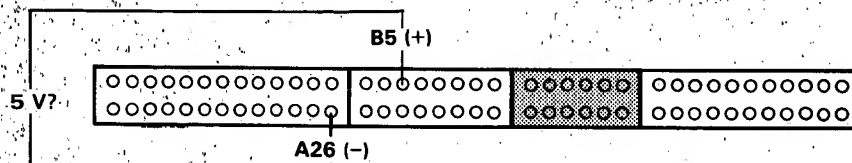
This signals the ECM when there is a demand for cooling from the air conditioning system.

### Inspection of Air Conditioning Signal.

Connect the test harness between the ECM and connectors. Disconnect "B" connector from the main wire harness only, not the ECM (see page 11-43).

Turn the ignition switch ON.

Measure voltage between B5 (+) terminal and A26 (-) terminal.



Is there approx. 5 V?

NO

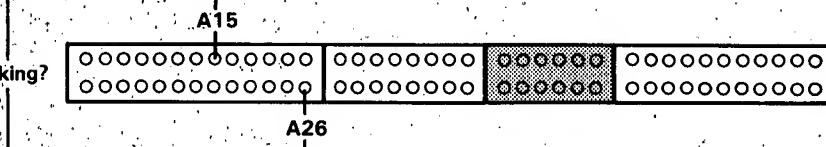
Substitute a known-good ECM and recheck. If prescribed voltage is now available, replace the original ECM.

YES

Reconnect "B" connector to the main wire harness.

Momentarily connect A15 terminal to A26 terminal several times.

Clicking?



Is there a clicking noise from the A/C compressor clutch?

NO

Connect the YEL terminal of the 4P connector on the A/C clutch relay to body ground.

YES



View from wire harness side

Start the engine.

Blower switch ON.

(To page 11-91)

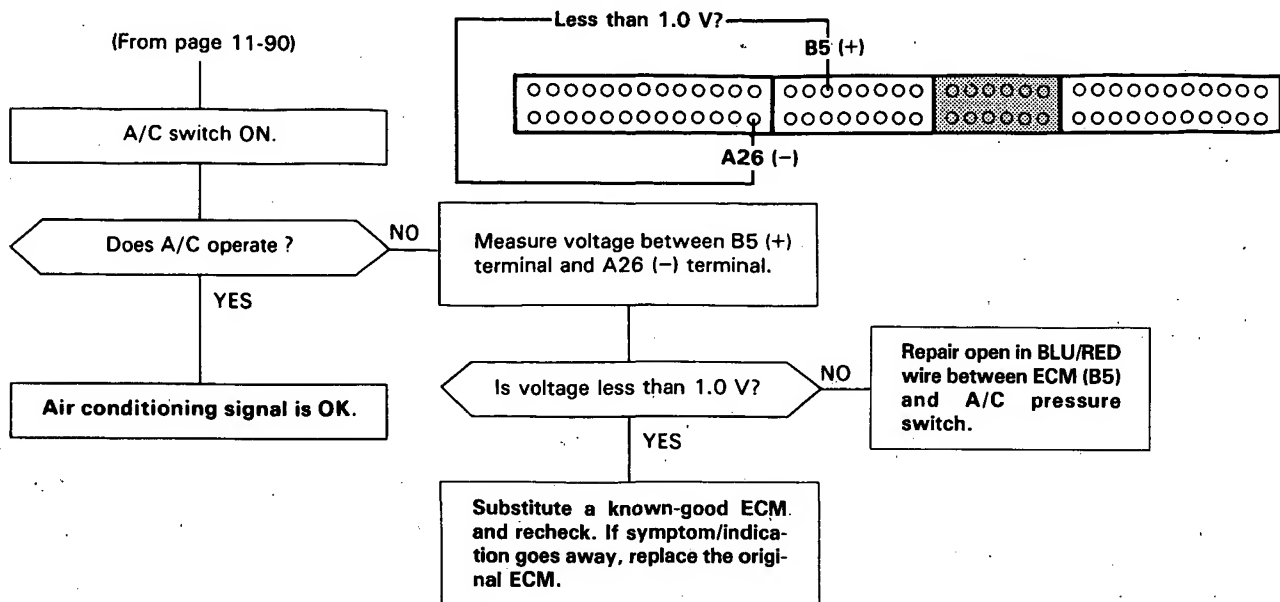
Is there a clicking noise from the A/C compressor clutch?

NO

See air conditioner inspection (see section 22).

YES

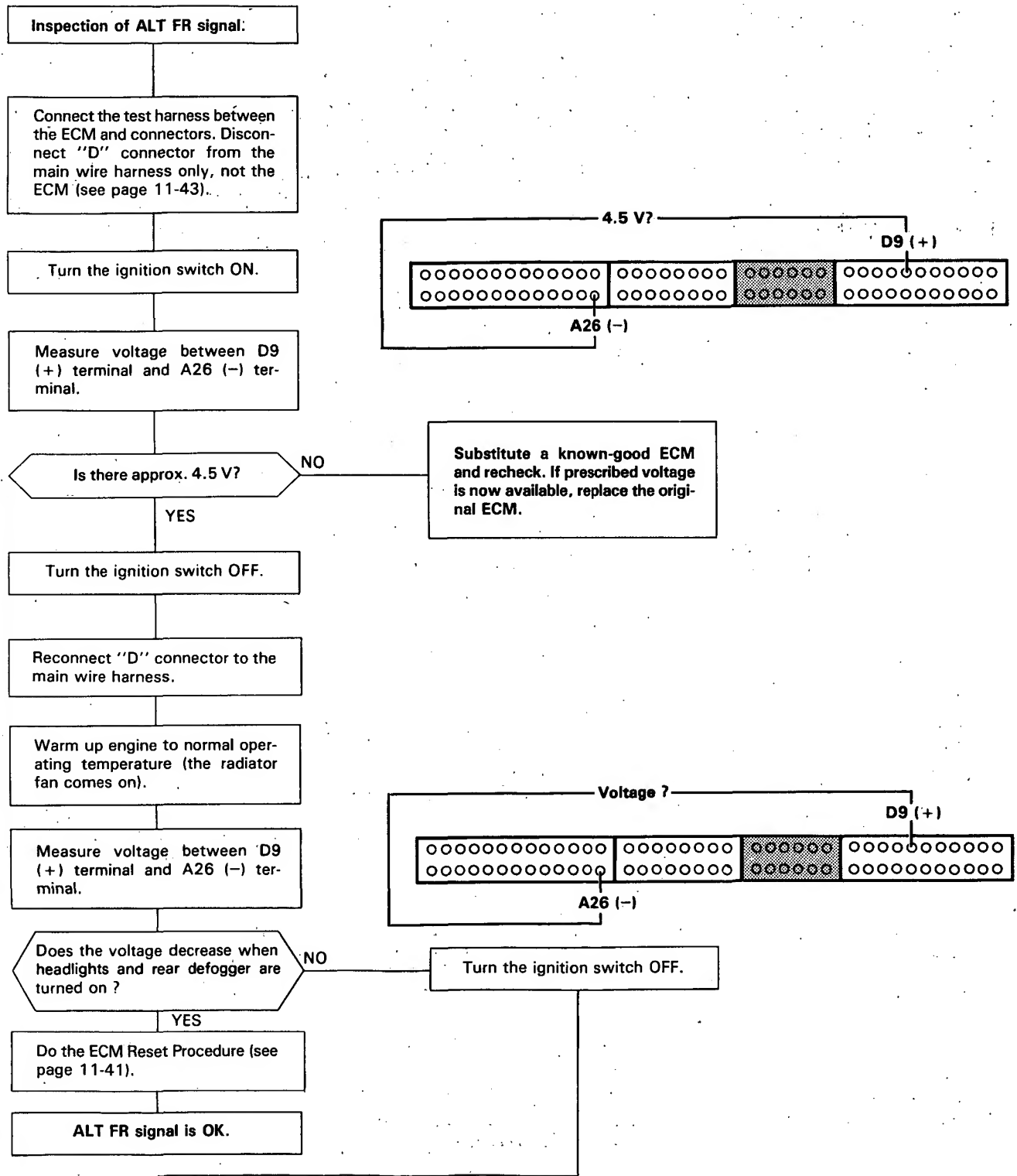
Repair open in YEL wire between ECM (A15) and A/C clutch relay.



# Idle Control System

## Troubleshooting Flowchart — Alternator (ALT) FR Signal

This signals the ECM when the Alternator (ALT) is charging.



(To page 11-93).



(From page 11-92)

Disconnect "D" connector from ECM only, not the main wire harness.

Disconnect the negative battery cable from the battery.

Check for continuity between D9 terminal and body ground.

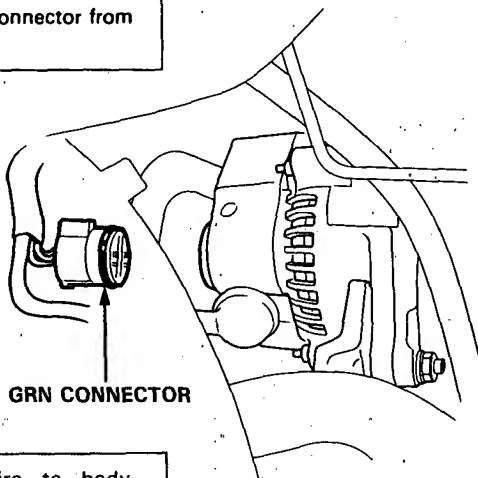
Is there continuity?

YES

Disconnect GRN connector from the alternator.

NO

Disconnect GRN connector from the alternator.



Connect BLU wire to body ground.

Check for continuity between D9 terminal and body ground.

Is there continuity?

YES

Repair short in BLU wire between ECM (D9) and alternator.

NO

See ALT inspection (see section 23).

Check for continuity between D9 terminal and body ground.

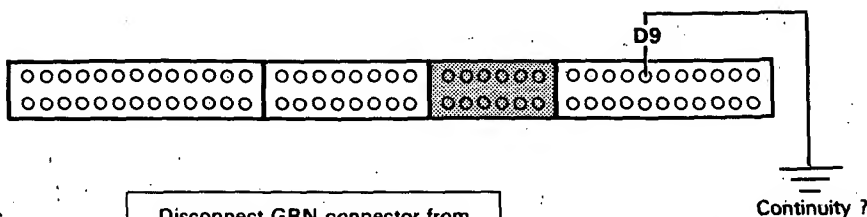
Is there continuity?

NO

See ALT inspection (see section 23).

YES

Repair open in BLU wire between ECM (D9) and ALT.

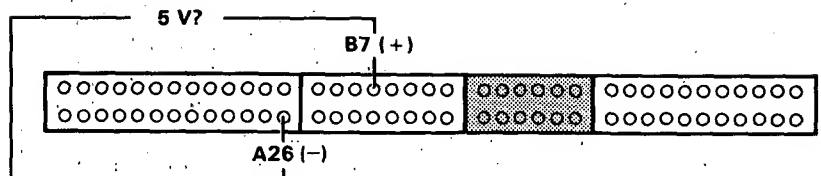
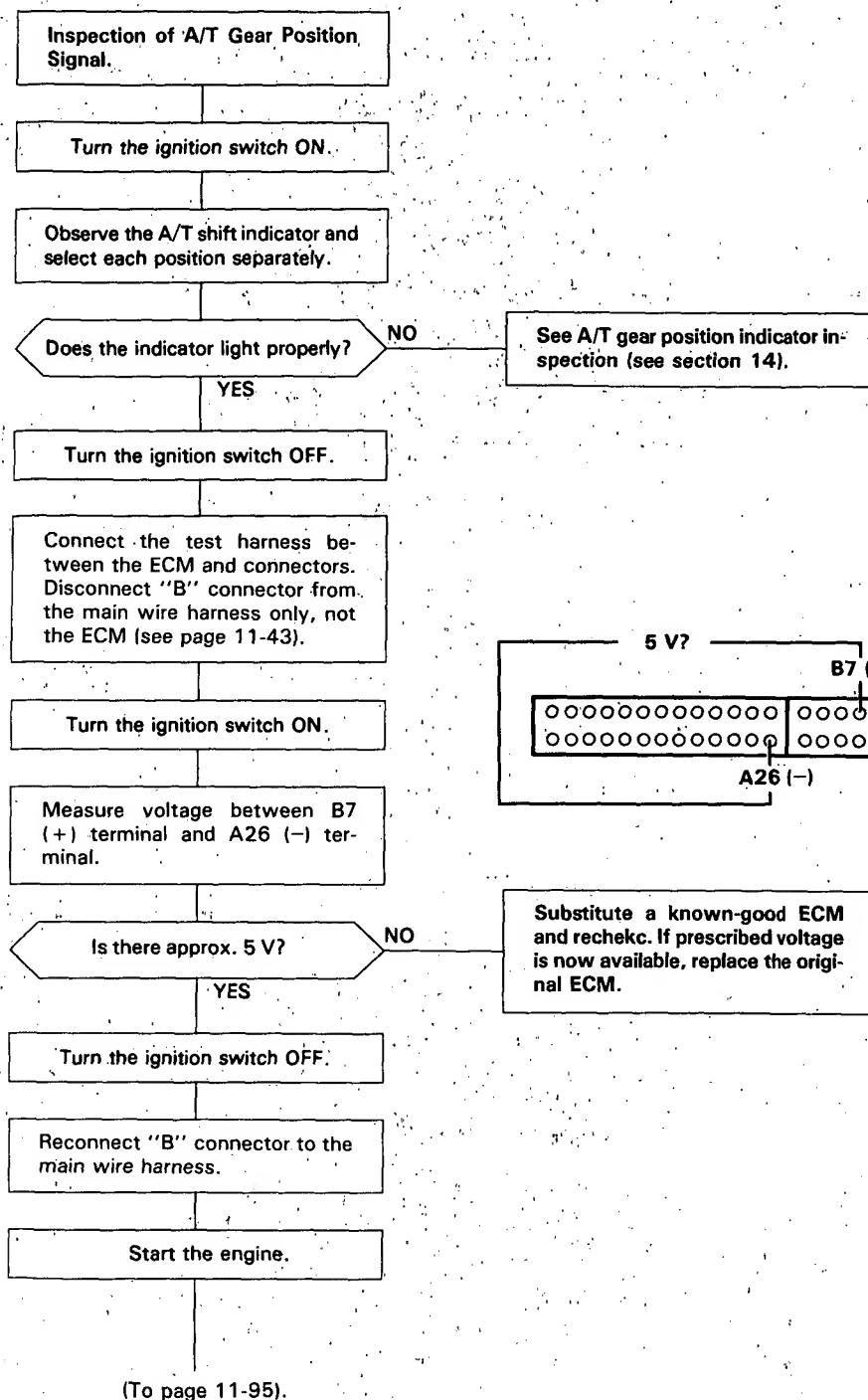


Continuity ?

# Idle Control System

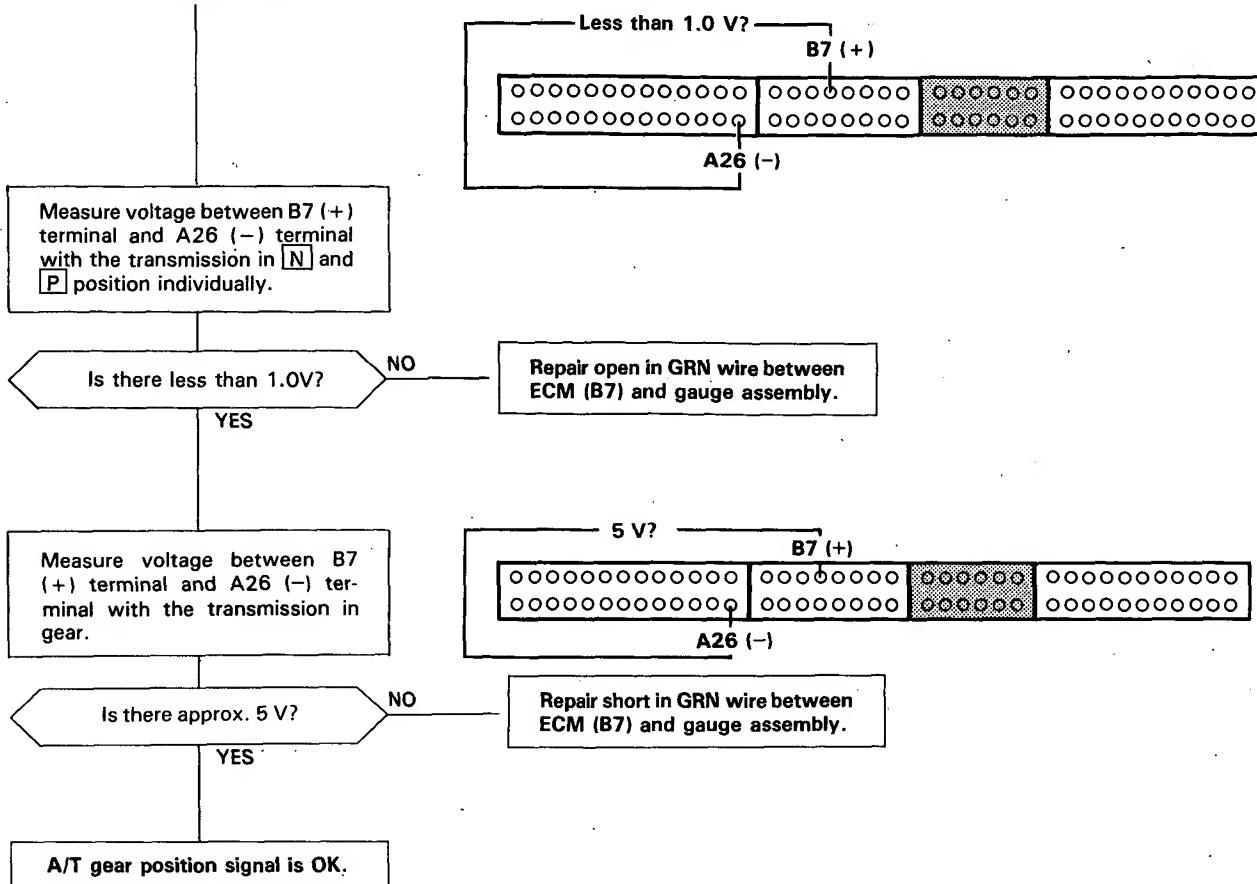
## Troubleshooting Flowchart — Automatic Transaxle (A/T) Gear Position Signal (A/T only)

This signals the ECM when the transmission is in Neutral or Park.





(From page 11-94)



# Idle Control System

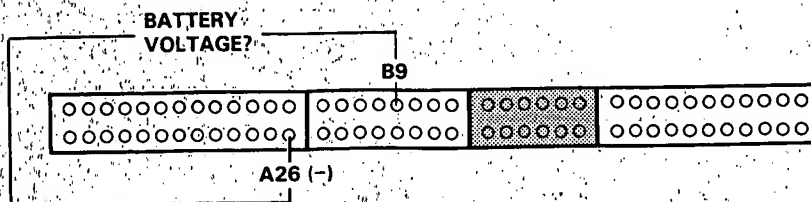
## Troubleshooting Flowchart — Starter Switch Signal

This signals the ECM when the engine is cranking.

**Inspection of Starter Switch Signal.**

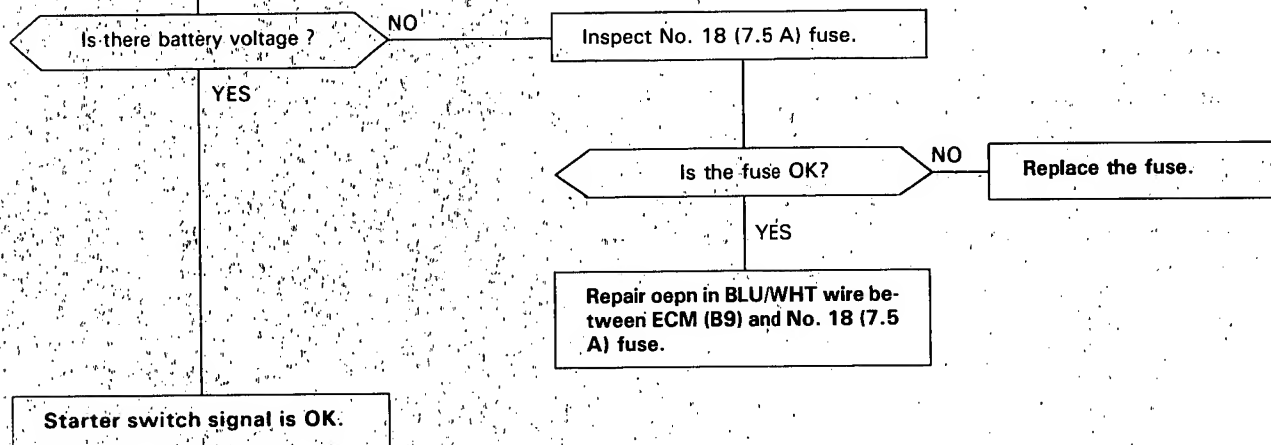
Connect the test harness between the ECM and connector (see page 11-43).

Measure voltage between B9 (+) terminal and A26 (-) terminal with the ignition switch in the start position.



### NOTE

- M/T: Clutch pedal must be depressed.
- A/T: Transmission in **N** or **P** position.



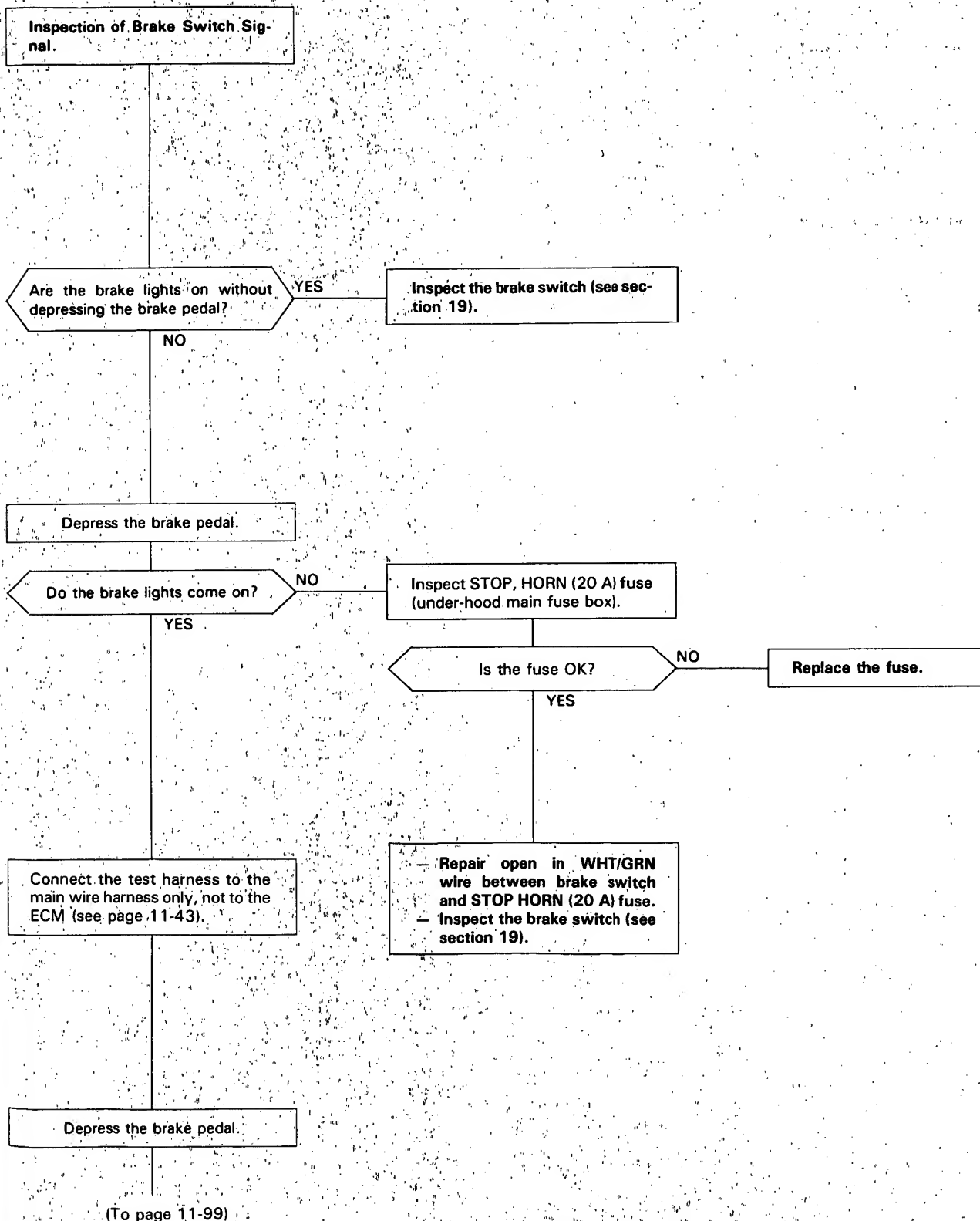




# Idle Control System

## Troubleshooting Flowchart — Brake Switch Signal

This signals the ECM when the brake pedal is depressed.





(From page 11-98)

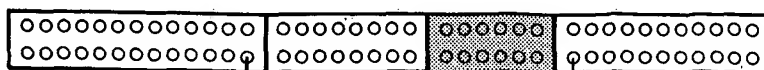
Measure voltage between D2 (+) terminal and A26 (-) terminal with the brake pedal depressed.

Is there battery voltage?

NO

YES

Brake switch signal is OK.



A26 (-)

D2 (+)

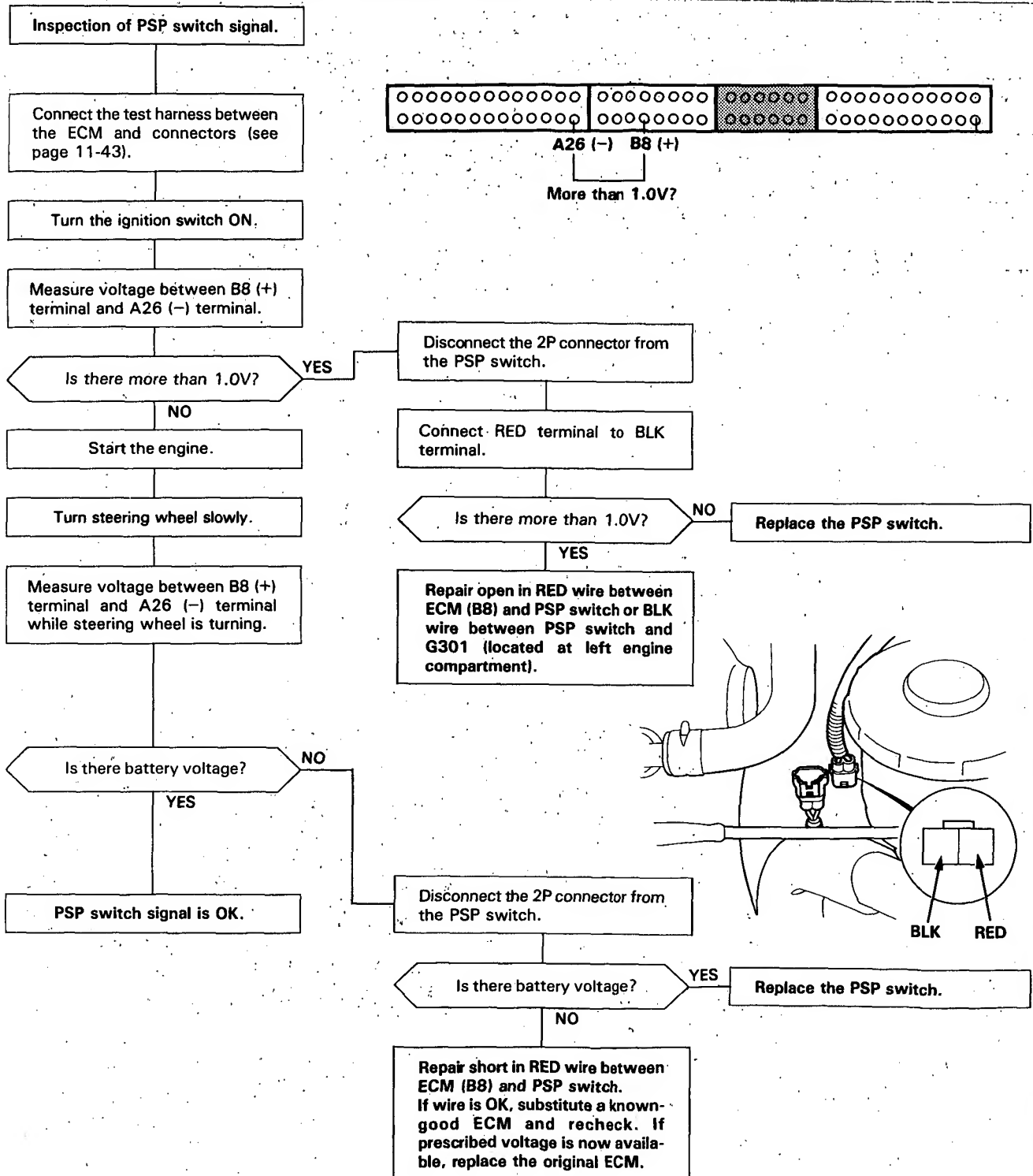
BATTERY  
VOLTAGE?

Repair open in GRN/WHT wire between the brake switch and ECM (D2).

# Idle Control System

## Troubleshooting Flowchart — Power Steering Pressure (PSP) Switch Signal

This signals the ECM when the power steering load is high.

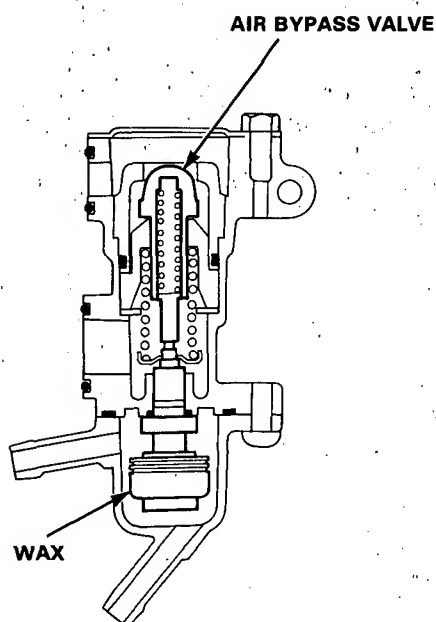
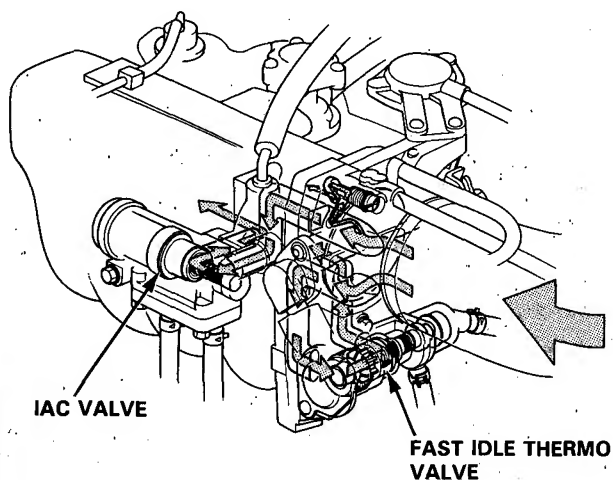




## Fast Idle Thermo Valve

### Description

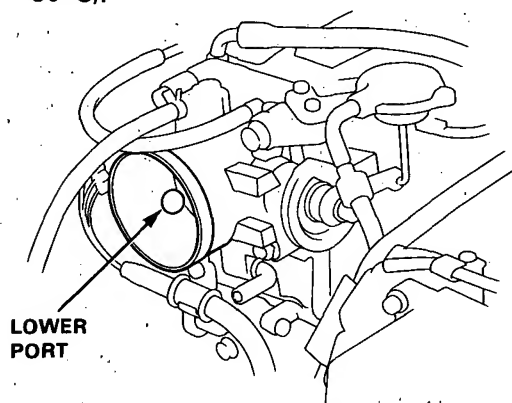
To prevent erratic running when the engine is warming up, it is necessary to raise the idle speed. The fast idle thermo valve is controlled by a thermowax plunger. When the engine is cold, the engine coolant surrounding the thermowax contracts the plunger, allowing additional air to be bypassed into the intake manifold so that the engine idles faster. When the engine reaches operating temperature, the valve closes, reducing the amount of air bypassing into the manifold.



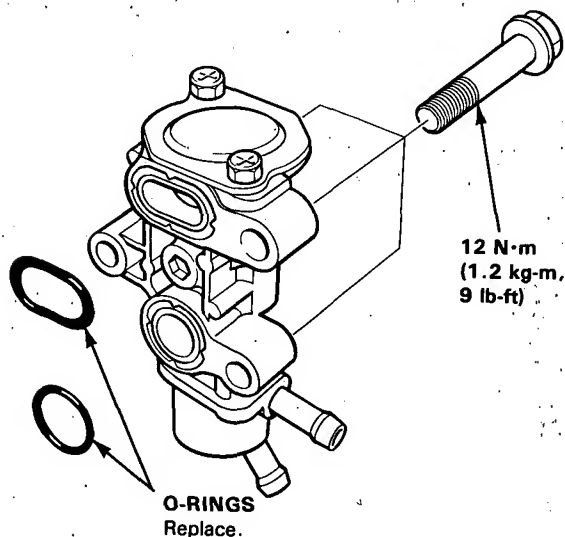
### Inspection

NOTE: The fast idle thermo valve is factory adjusted; it should not be disassembled.

1. Remove the intake air duct from the throttle body.
2. Start the engine.
3. Put your finger over the lower port in throttle body and make sure that there is air flow with the engine cold (engine coolant temperature below 86°F, 30°C).



- If not, replace the fast idle thermo valve and retest.



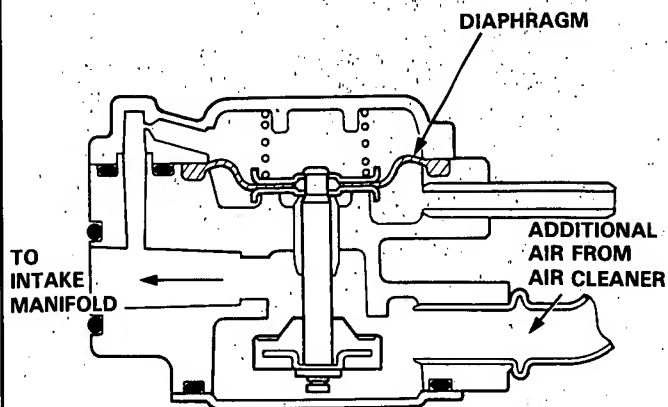
4. Warm up the engine (the radiator fan comes on).
5. Check that the valve is completely closed. If not, air suction can be felt at the lower port in the throttle body.
  - If any suction is felt, the valve is leaking. Check engine coolant level and for air in the engine coolant system (see section 10). If OK, replace the fast idle thermo valve and recheck.

# Idle Control System

## Starting Air Valve [B18A1 engine: A/T only]

### Description

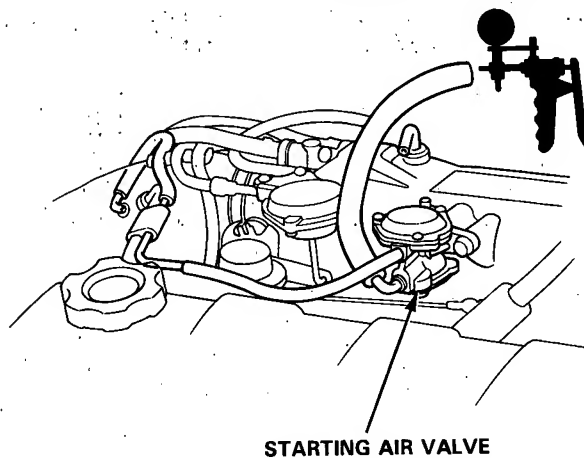
When cranking the engine, the starting air valve supplies additional air to the intake manifold to ease engine starting.



### Inspection

1. With the engine off, disconnect the vacuum hose from the intake manifold and connect the vacuum pump to the vacuum hose.

VACUUM PUMP/GAUGE  
A973X-041-XXXXX



2. Apply vacuum to the hose.  
It should not hold vacuum.
  - If vacuum is held, replace the starting air valve.
  - If vacuum is not held, go to step 3.
3. Disconnect the vacuum pump/gauge.
4. Start the engine and allow it to idle.  
Reconnect the vacuum pump/gauge to the hose.  
There should be no vacuum at the hose.
  - If there is vacuum, replace the starting air valve and retest.
  - If there is no vacuum, the starting air valve is OK.

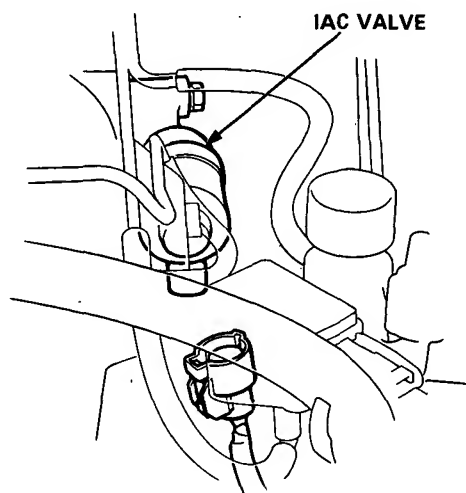


## Idle Speed Setting

### Inspection/Adjustment

**NOTE:** (Canada) Pull the parking brake lever up. Start the engine, then check that the headlights are off.

1. Start the engine and warm it up to normal operating temperature (the radiator fan comes on).
2. Connect a tachometer.
3. Disconnect the 2P connector from the Idle Air Control (IAC) valve.



4. Start the engine with the accelerator pedal slightly depressed. Stabilize the rpm at 1000, then slowly release the pedal until the engine idles.
5. Check idling in no-load conditions: headlights, blower fan, rear defogger, radiator fan, and air conditioner are not operating.

**Idle speed should be;**

**B18A1 engine:**

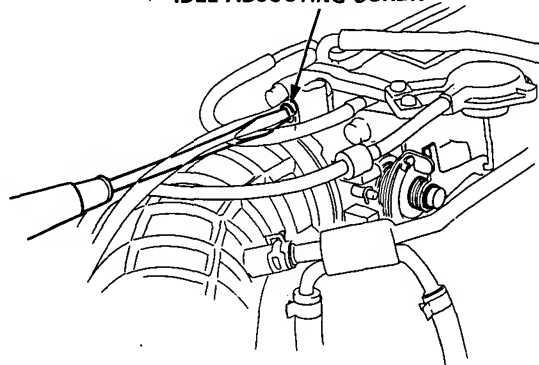
M/T	600 $\pm$ 50 rpm
A/T	600 $\pm$ 50 rpm (in <b>N</b> or <b>P</b> position)

**B17A1 engine:** 600  $\pm$  50 rpm

Adjust the idle speed, if necessary, by turning the idle adjusting screw.

**NOTE:** If the idle speed is excessively high, check the throttle valve dashpot system (see page 11-131).

**IDEL ADJUSTING SCREW**



6. Turn the ignition switch OFF.
7. Reconnect the 2P connector on the IAC valve, then remove the BACK UP (7.5 A) (Canada: HAZARD, BACK UP (10 A)) fuse in the under-hood main fuse box for 10 seconds to reset the ECM.
8. Restart and idle the engine with no-load conditions for one minute, then check the idle speed.

**NOTE:** (Canada) Pull the parking brake lever up. Start the engine, then check that the headlights are off.

**Idle speed should be;**

**B18A1 engine:**

M/T	750 $\pm$ 50 rpm
A/T	750 $\pm$ 50 rpm (in <b>N</b> or <b>P</b> position)

**B17A1 engine:** 800  $\pm$  50 rpm

9. Idle the engine for one minute with headlights (Hi) ON and check the idle speed.

**Idle speed should be;**

**B18A1 engine:**

M/T	750 $\pm$ 50 rpm
A/T	750 $\pm$ 50 rpm (in <b>N</b> or <b>P</b> position)

**B17A1 engine:** 800  $\pm$  50 rpm

(cont'd)

## Idle Control System

### Idle Speed Setting (cont'd)

10. Turn the headlights and rear defogger off.

Idle the engine for one minute with heater fan switch at HI and air conditioner on, then check the idle speed.

Idle speed should be:

**B18A1 engine:**

M/T	750 $\pm$ 50 rpm
A/T	750 $\pm$ 50 rpm (in <b>N</b> or <b>P</b> position)

**B17A1 engine:** 800  $\pm$  50 rpm

**NOTE:** If the idle speed is not within specification, see System Troubleshooting Guide on page 11-84.



# Fuel Supply System



## System Troubleshooting Guide

NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE	SUB-SYSTEM	FUEL INJECTOR	FUEL PRESSURE REGULATOR	FUEL FILTER	FUEL PUMP	PGM-FI MAIN RELAY	CONTAMINATED FUEL
	SYMPTOM	108	112	116	117	119	—
	ENGINE WON'T START			③	①	②	
	DIFFICULT TO START ENGINE WHEN COLD OR HOT			①			
	ROUGH IDLE	①					②
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING	①	③				②
	FAILS EMISSION TEST	②	①				
	LOSS OF POWER	③		②	①		
FREQUENT STALLING	WHILE WARMING UP		①				
	AFTER WARMING UP		①				

# Fuel Supply System

## System Description

The fuel supply system consists of a fuel tank, in-tank high pressure fuel pump, PGM-FI main relay, fuel filter, fuel pressure regulator, fuel injectors, and fuel delivery and return lines. This system delivers pressure-regulated fuel to the fuel injectors and cuts the fuel delivery when the engine is not running.

## Fuel Pressure

### Relieving

#### ⚠ WARNING

- Do not smoke while working on the fuel system. Keep open flames or sparks away from your work area.
- Be sure to relieve fuel pressure while the engine is off.

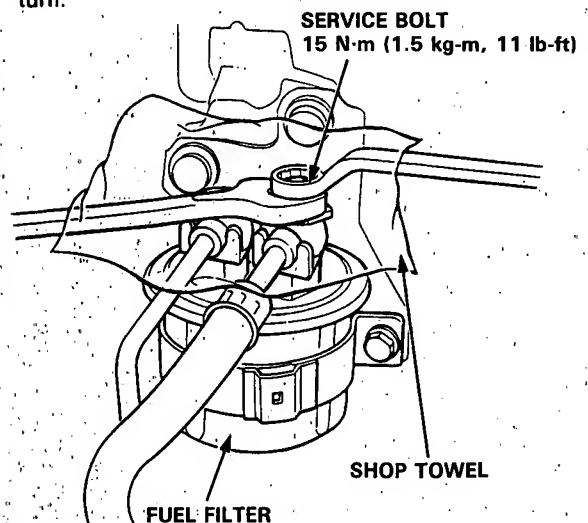
**NOTE:** Before disconnecting fuel pipes or hoses, release pressure from the system by loosening the 6 mm service bolt on top of the fuel filter.

1. Disconnect the battery negative cable from the battery negative terminal.

**NOTE:** The GS and GS-R model radio may have a coded theft protection circuit. Be sure to get the customer's code number before disconnecting the battery.

After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

2. Remove fuel fill cap.
3. Use a box end wrench on the 6 mm service bolt at the fuel filter, while holding the special banjo bolt with another wrench.
4. Place a rag or shop towel over the 6 mm service bolt.
5. Slowly loosen the 6 mm service bolt one complete turn.



#### NOTE:

- A fuel pressure gauge can be attached at the 6 mm service bolt hole.
- Always replace the washer between the service bolt and the special banjo bolt, whenever the service bolt is loosened.
- Replace all washers whenever the bolts are removed.



## Inspection

1. Relieve fuel pressure (see page 11-106).
2. Remove the service bolt on the fuel filter while holding the banjo bolt with another wrench. Attach the special tool.
3. Start the engine.\* Measure the fuel pressure with the engine idling and vacuum hose of the fuel pressure regulator disconnected from the fuel pressure regulator and pinched.

Pressure should be;

**B18A1 engine:**

290–340 kPa (2.9–3.4 kg/cm<sup>2</sup>, 41–48 psi)

**B17A1 engine:**

340–390 kPa (3.4–3.9 kg/cm<sup>2</sup>, 48–56 psi)

4. Reconnect vacuum hose to the fuel pressure regulator.

Pressure should be;

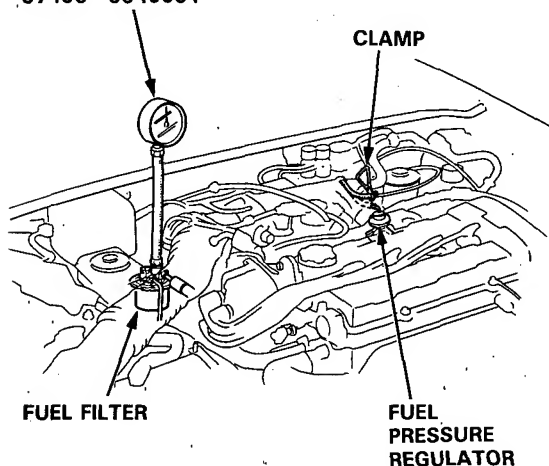
**B18A1 engine:**

225–275 kPa (2.25–2.75 kg/cm<sup>2</sup>, 32–39 psi)

**B17A1 engine:**

275–325 kPa (2.75–3.25 kg/cm<sup>2</sup>, 39–46 psi)

**FUEL PRESSURE GAUGE**  
07406–0040001



\*: If the engine will not start, turn the ignition switch on, wait for two seconds, turn it off, then back on again and read the fuel pressure.

- If the fuel pressure is not as specified, first check the fuel pump (see page 11-118). If the fuel pump is OK, check the following:
- If the fuel pressure is higher than specified, inspect for:
  - Pinched or clogged fuel return hose or piping.
  - Faulty fuel pressure regulator (see page 11-112).
- If the fuel pressure is lower than specified, inspect for:
  - Clogged fuel filter.
  - Faulty fuel pressure regulator (see page 11-112).
  - Leakage in the fuel line.

# Fuel Supply System

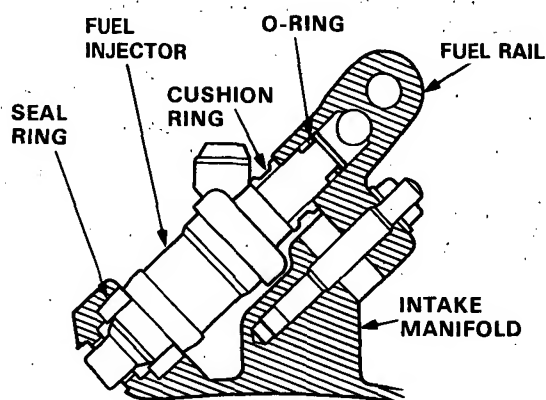
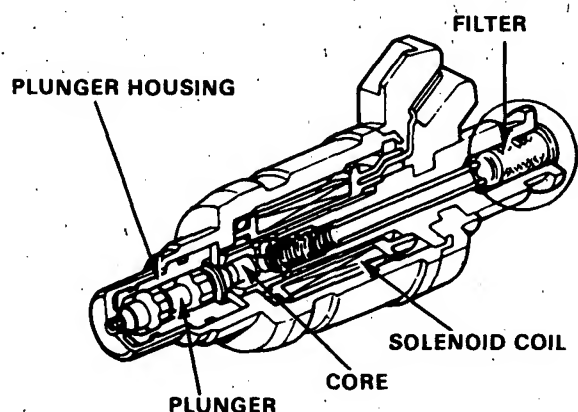
## Fuel Injectors

### Troubleshooting Flowchart

**16**

The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 16: A problem in the Fuel Injector circuit.

The injectors are a solenoid-actuated constant-stroke pintle type consisting of a solenoid, plunger needle valve and housing. When current is applied to the solenoid coil, the valve lifts up and pressurized fuel is injected. Because the needle valve lift and the fuel pressure are constant, the injection quantity is determined by the length of time that the valve is open (i.e., the duration the current is supplied to the solenoid coil). The Fuel Injector is sealed by an O-ring and seal ring at the top and bottom. These seals also reduce operating noise.

**16**

- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 16 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Start the engine and allow it to idle.

NOTE: If engine will not start, it may take 10 seconds of cranking to set the code.

Is the MIL on and does it indicate code 16?

**NO****YES**

Intermittent failure, system is OK at this time (test drive may be necessary).  
Check for poor connections or loose wires at C318 (located at left shock tower), C107, C108, C109, C110 (fuel injector), and ECM.

(To page 11-109)

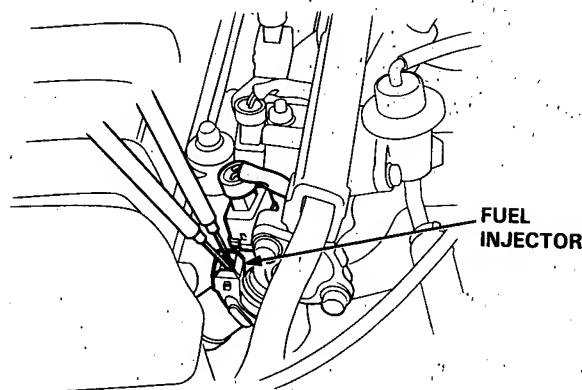
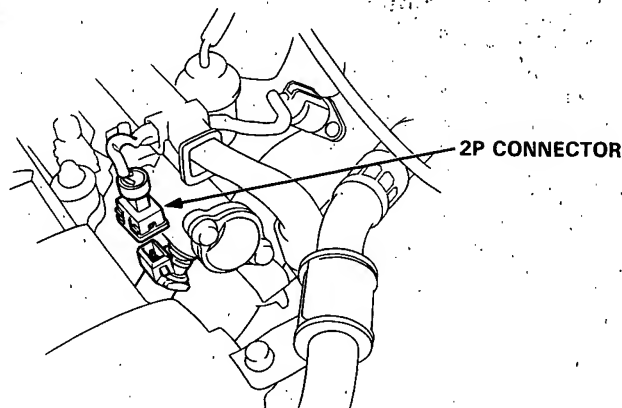


(From page 11-108)

Turn the ignition switch OFF.

Disconnect the 2P connector from the injector that does not click.

Measure resistance between the 2 terminals of the fuel injector.



Is there 10–13  $\Omega$ ?

NO

Replace the fuel injector/injectors that are not 10–13  $\Omega$ .

YES

Turn the ignition switch ON.

Measure voltage between YEL/BLK (+) terminal in the 2P connector and body ground.

Is there battery voltage?

NO

Repair open in the YEL/BLK wire between the fuel injector and the PGM-FI main relay.

YES

(To page 11-110)

(cont'd)

# Fuel Supply System

## Fuel Injectors (cont'd)

(From page 11-109)

Reconnect the 2P connector to the fuel injector.

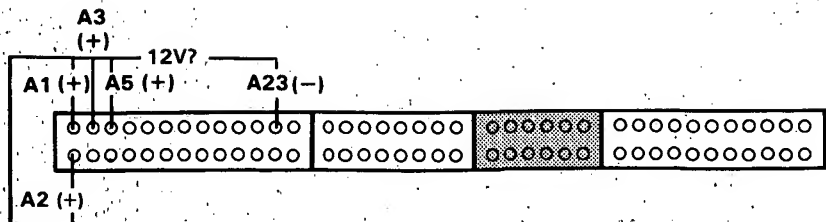
Turn the ignition switch OFF.

Connect the test harness between the ECM and connector (see page 11-43).

Turn the ignition switch ON.

Measure voltage between A23 (-) terminal and following terminal:

- No. 1 fuel injector: A1 (+) terminal.
- No. 2 fuel injector: A3 (+) terminal.
- No. 3 fuel injector: A5 (+) terminal.
- No. 4 fuel injector: A2 (+) terminal.



Is there battery voltage ?

NO

Repair open in the wire between the ECM (A1, A3, A5 or A2) and the fuel injector.

YES

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.



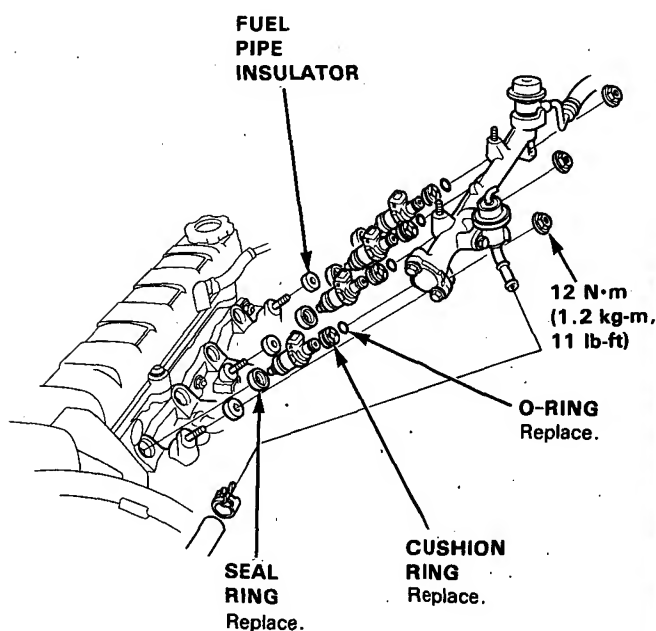
## Replacement

**⚠ WARNING** Do not smoke during the work. Keep open flames away from your work area.

1. Relieve fuel pressure (see page 11-106).
2. Disconnect the connectors from the fuel injectors.
3. Disconnect the vacuum hose and fuel return hose from the fuel pressure regulator.

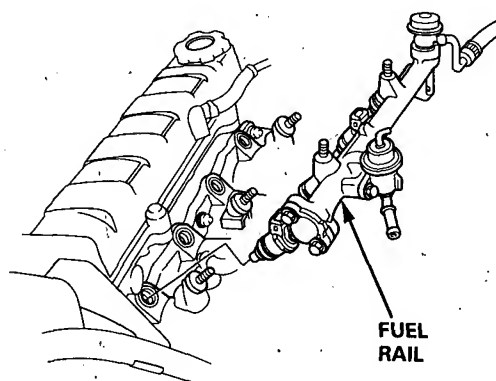
**NOTE:** Place a rag or shop towel over the hoses before disconnecting them.

4. Loosen the retainer nuts on the fuel rail and harness holder.
5. Disconnect the fuel rail.
6. Remove the fuel injectors from the intake manifold.

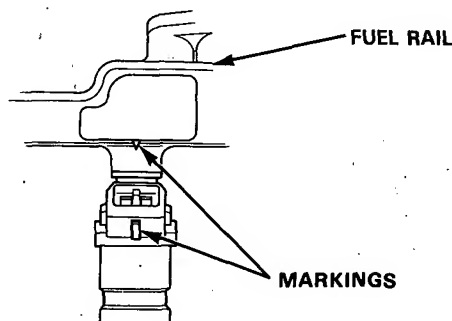


7. Slide new cushion rings onto the fuel injectors.
8. Coat new O-rings with clean engine oil and put them on the fuel injectors.
9. Insert the injectors into the fuel rail first.
10. Coat new seal rings with clean engine oil and press them into the intake manifold.
11. Install the fuel injectors and fuel rail assembly in the manifold.

**CAUTION:** To prevent damage to the O-ring, install the fuel injectors in the fuel rail first, then install them in the intake manifold.



12. Align the center line on the connector with the mark on the fuel rail.



13. Install and tighten the retainer nuts.
14. Connect the vacuum hose and fuel return hose to the fuel pressure regulator.
15. Install the connectors on the fuel injectors.
16. Turn the ignition switch ON but do not operate the starter. After the fuel pump runs for approximately two seconds, the fuel pressure in the fuel line rises. Repeat this two or three times, then check whether there is any fuel leakage.

# Fuel Supply System

## Fuel Pressure Regulator

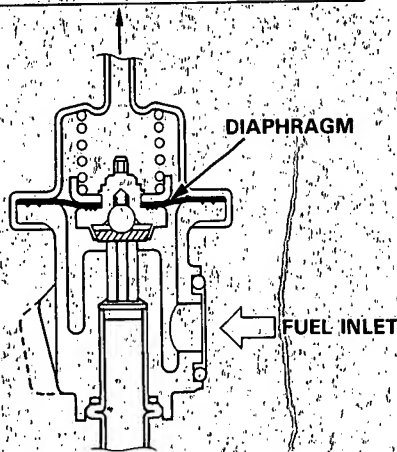
### Description

The fuel pressure regulator maintains a constant fuel pressure to the fuel injectors. When the difference between the fuel pressure and manifold pressure exceeds  $3.0 \text{ kg/cm}^2$  (43 psi) (B17A1 engine;  $3.5 \text{ kg/cm}^2$ , 50 psi), the diaphragm is pushed upward, and the excess fuel is fed back into the fuel tank through the return line.

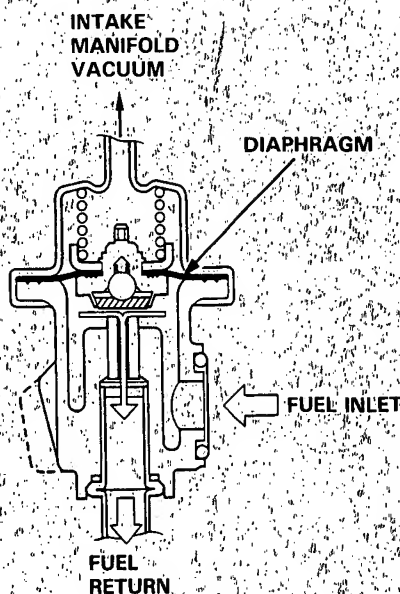
### CLOSE

B18A1 engine:  
TO FUEL  
PRESSURE  
REGULATOR  
CONTROL SOLENOID  
VALVE

B17A1 engine  
TO  
INTAKE  
MANIFOLD



### OPEN



### Testing

**⚠ WARNING** Do not smoke during the test. Keep open flames away from your work area.

1. Attach a fuel pressure gauge to the service port of the fuel filter (see page 11-107).

Pressure should be:

B18A1 engine:

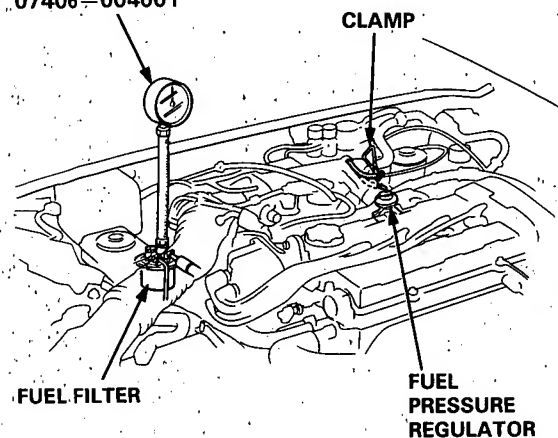
290–340 kPa (2.9–3.4 kg/cm<sup>2</sup>, 41–48 psi)

B17A1 engine:

340–390 kPa (3.4–3.9 kg/cm<sup>2</sup>, 48–56 psi)

(with the fuel pressure regulator vacuum hose disconnected and pinched)

FUEL PRESSURE GAUGE  
07406–004001



2. Reconnect the vacuum hose to the fuel pressure regulator.
3. Check that the fuel pressure rises when the vacuum hose from the fuel pressure regulator is disconnected again.

- If the fuel pressure did not rise, replace the fuel pressure regulator.

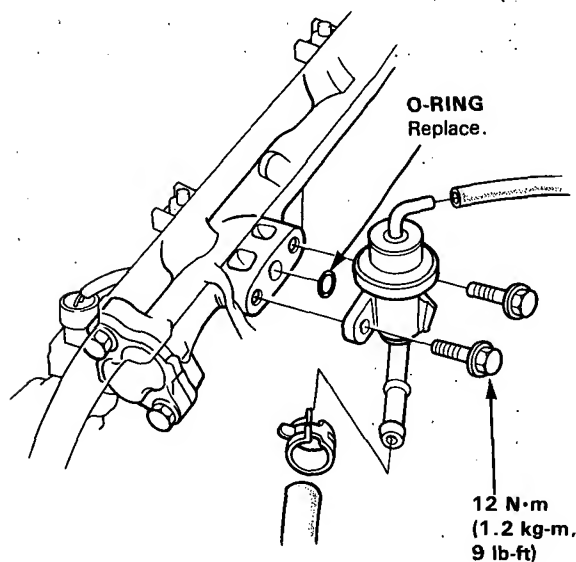




## Replacement

**⚠ WARNING** Do not smoke while working on fuel system. Keep open flame away from your work area.

1. Place a shop towel under the fuel pressure regulator, then relieve fuel pressure (see page 11-106).
2. Disconnect the vacuum hose and fuel return hose.
3. Remove the two 6 mm retainer bolts.



### NOTE:

- Replace the O-ring.
- When assembling the fuel pressure regulator, apply clean engine oil to the O-ring and assemble it into its proper position, taking care not to damage the O-ring.

# Fuel Supply System

## Fuel Pressure Regulator [B18A1 engine] (cont'd)

### Fuel Pressure Regulator Control Solenoid Valve

### Troubleshooting Flowchart

Inspection of Fuel Pressure Regulator Control Solenoid Valve.

Start the engine and warm up to normal operating temperature (the radiator fan comes on).

Disconnect the #1 vacuum hose from the fuel pressure regulator and connect a vacuum gauge to the hose.

Is there manifold vacuum?

NO

YES

Turn the ignition switch OFF.

Disconnect the 4P connector from the solenoid valve.

Connect battery positive to terminal C and battery negative to terminal D of the solenoid valve.

Start the engine and allow it to idle.

Disconnect the 4P connector from the solenoid valve

Is there vacuum?

NO

YES

Repair short to ground in GRN/YEL wire between ECM (A10) and 4P connector.  
If wire is OK, substitute a known-good ECM and recheck. If symptom goes away, replace the original ECM.

FUEL PRESSURE REGULATOR CONTROL SOLENOID VALVE

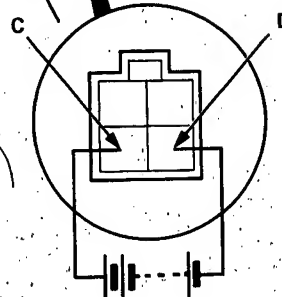
#1 VACUUM HOSE

VACUUM PUMP/ GAUGE  
A973X-041-XXXXX

FUEL PRESSURE REGULATOR

Check the #1 and #20 vacuum hose.  
If hoses are OK, replace the solenoid valve.

FUEL PRESSURE REGULATOR CONTROL SOLENOID VALVE



(To page 11-115)



(From page 11-114)

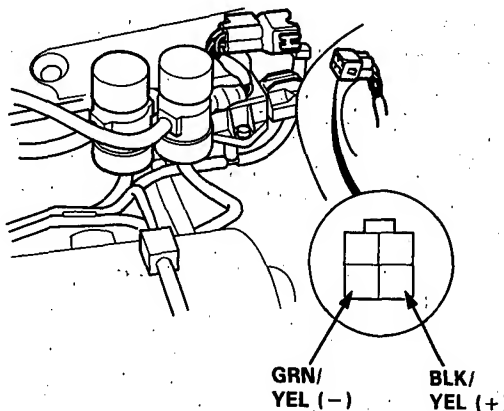
Is there manifold vacuum ?

YES

Replace the solenoid valve.

NO

Measure voltage between BLK/  
YEL (+) terminal and body  
ground.



Is there battery voltage ?

NO

Repair in BLK/YEL wire between  
No. 24 (15 A) fuse and 4P con-  
nector.

YES

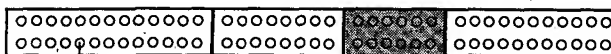
Turn the ignition switch OFF.

Reconnect the 4P connector to  
the solenoid valve.

Connect the test harness between  
the ECM and connectors (see  
page 11-43).

Start the engine and allow it to  
idle.

Connect A10 terminal to body  
ground with a jumper wire.



A10

Is there manifold vacuum ?

YES

Repair open in GRN/YEL wire be-  
tween ECM (A10) and the 4P con-  
nector.

NO

The Fuel Pressure Regulator Con-  
trol Solenoid Valve is OK.

# Fuel Supply System

## Fuel Filter

### Replacement

#### ⚠ WARNING

- Do not smoke while working on fuel system. Keep open flame away from your work area.
- While replacing the fuel filter, be careful to keep a safe distance between battery terminals and any tools.

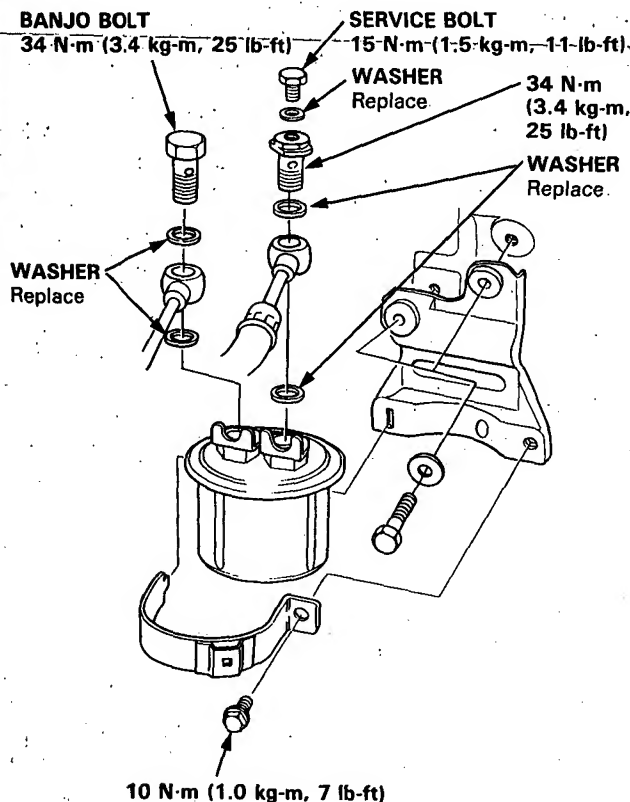
The fuel filter should be replaced every 4 years or 60,000 miles (96,000 km), whichever comes first or whenever the fuel pressure drops below the specified value [290–340 kPa, 2.9–3.4 kg/cm<sup>2</sup>, 41–48 psi (B17A1 engine: 340–390 kPa, 3.4–3.9 kg/cm<sup>2</sup>, 48–56 psi) with the fuel pressure regulator vacuum hose disconnected] after making sure that the fuel pump and the fuel pressure regulator are OK.

1. Disconnect the battery negative cable from the battery negative terminal.

NOTE: The GS and GS-R model radio may have a coded theft protection circuit. Be sure to get the customer's code number before disconnecting the battery.

After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

2. Place a shop towel under and around the fuel filter.
3. Relieve fuel pressure (see page 11-106).
4. Remove the 12 mm banjo bolt and the fuel feed pipe from the fuel filter.
5. Remove the fuel filter clamp and fuel filter.
6. When assembling, use new washers, as shown.

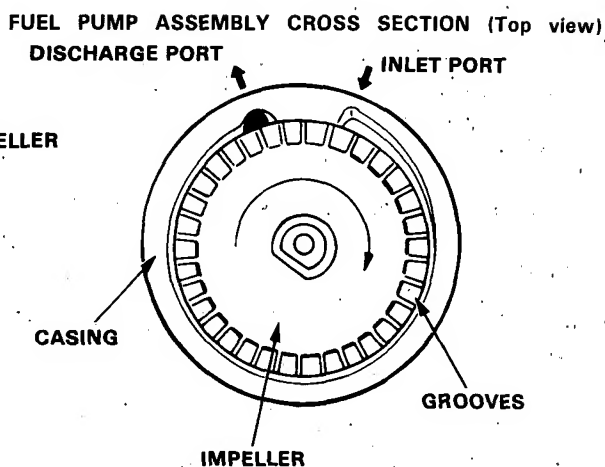
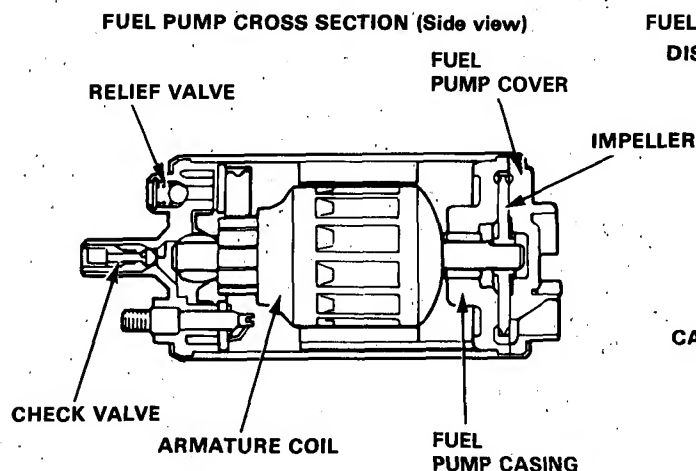
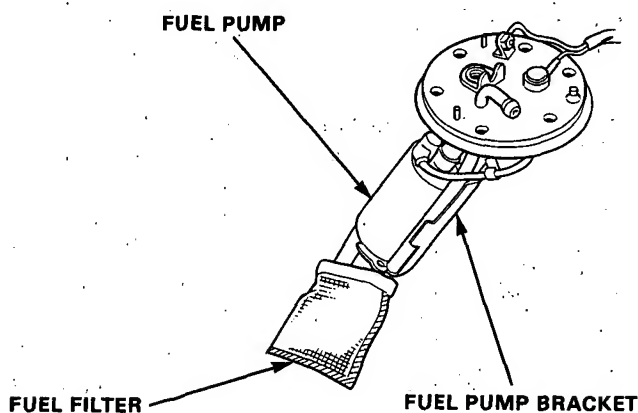




## Fuel Pump

### Description

Because of its compact impeller design, the fuel pump is installed inside the fuel tank, thereby saving space and simplifying the fuel line system.



The fuel pump consists of a DC motor, a circumference flow pump, a relief valve for protecting the fuel line systems, a check valve for retaining residual pressure, an inlet port, and a discharge port. The fuel pump assembly consists of the impeller (driven by the motor), the fuel pump casing (which forms the pumping chamber), and the fuel pump cover.

### OPERATION

- (1) When the engine is started, the PGM-FI main relay actuates the fuel pump, and the motor turns together with the impeller.  
Differential pressure is generated by the numerous grooves around the impeller.
- (2) Fuel entering the inlet port flows inside the motor from the pumping chamber and is forced through the discharge port via the check valve.  
If fuel flow is obstructed at the discharge side of the fuel line, the relief valve will open to bypass the fuel to the inlet port and prevent excessive fuel pressure.
- (3) When the engine stops, the fuel pump stops automatically. However, a check valve closes by spring action to retain the residual pressure in the line, helping the engine to restart more easily.

(cont'd)

# Fuel Supply System

## Fuel Pump (cont'd)

### Testing

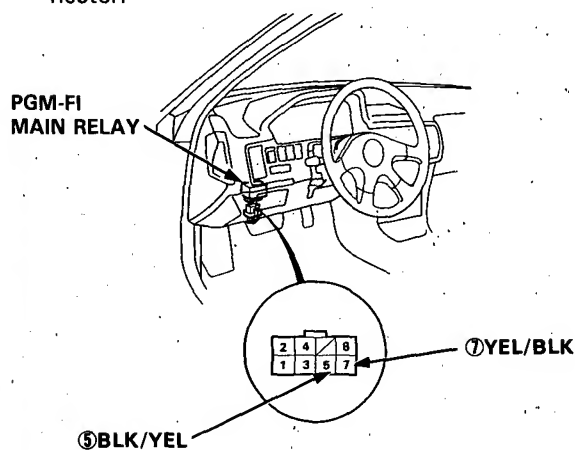
**⚠ WARNING** Do not smoke during the test. Keep open flame away from your work area.

If you suspect a problem with the fuel pump, check that the fuel pump actually runs; when it is ON, you will hear some noise if you hold your ear to the fuel fill port with the fuel fill cap removed. The fuel pump should run for two seconds, when ignition switch is first turned on. If the fuel pump does not make noise, check as follows:

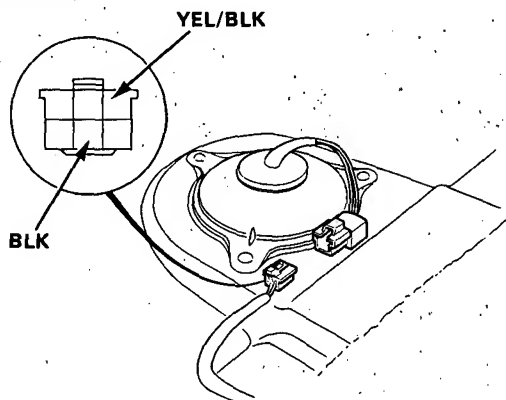
1. Remove the rear seat (see section 20).
2. Disconnect the 6P connector.

**CAUTION:** Be sure to turn the ignition switch OFF before disconnecting the wires.

3. Connect the BLK/YEL ⑤ wire and YEL/BLK ⑦ wire with a jumper wire at the PGM-FI main relay connector.



4. Check that battery voltage is available at the fuel pump connector when the ignition switch is turned ON (positive probe to the YEL/BLK wire, negative probe to the BLK wire).

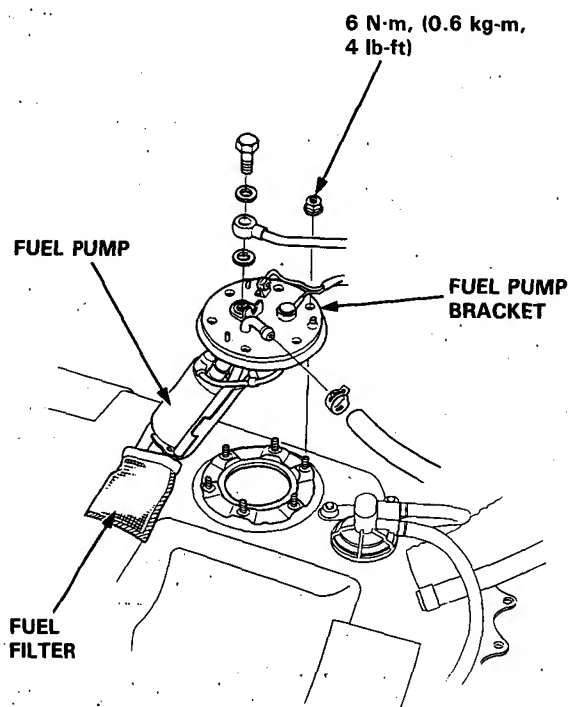


- If battery voltage is available, replace the fuel pump.
- If there is no voltage, check the fuel pump ground and wire harness (see page 11-120).

### Replacement

**⚠ WARNING** Do not smoke while working on fuel system. Keep open flames away from your work area.

1. Relieve fuel pressure (see page 11-106).
2. Remove the fuel tank (see page 11-122).
3. Remove the fuel pump mounting nuts.
4. Remove the fuel pump from the fuel tank.





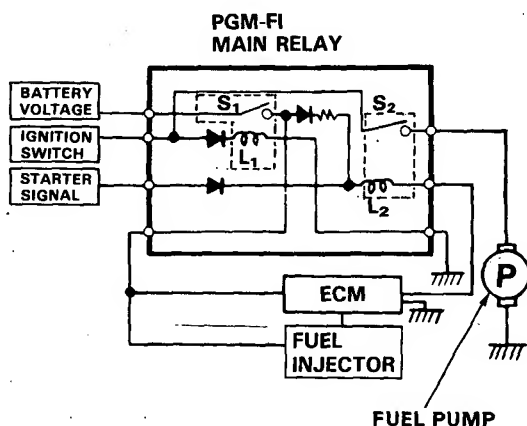
## PGM-FI Main Relay

### Description

The PGM-FI main relay actually contains two individual relays.

The relay is located at the left side of the cowl. One relay is energized whenever the ignition is on which supplies the battery voltage to the ECM, power to the fuel injectors, and power for the second relay.

The second relay is energized for 2 seconds when the ignition is switched on, and when the engine is running which supplies power to the fuel pump.

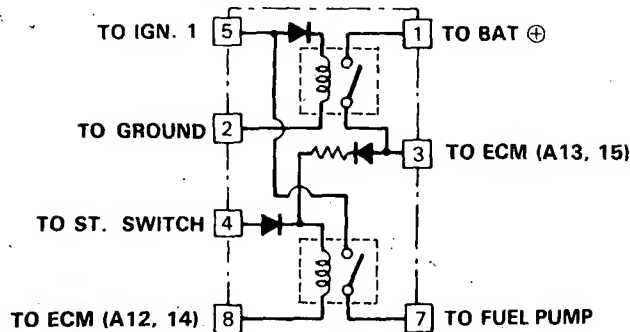
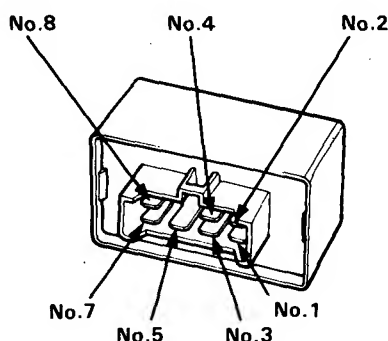


### Relay Testing

NOTE: If the car starts and continues to run, the PGM-FI main relay is OK.

1. Remove the PGM-FI main relay.
2. Attach the battery positive terminal to the No. 4 terminal and the battery negative terminal to the No. 8 terminal of the PGM-FI main relay. Then check for continuity between the No. 5 terminal and No. 7 terminal of the PGM-FI main relay.

- If there is continuity, go on to step 3.
- If there is no continuity, replace the relay and retest.



3. Attach the battery positive terminal to the No. 5 terminal and the battery negative terminal to the No. 2 terminal of the PGM-FI main relay. Then check that there is continuity between the No. 1 terminal and No. 3 terminal of the PGM-FI main relay.

- If there is continuity, go on to step 4.
- If there is no continuity, replace the relay and retest.

4. Attach the battery positive terminal to the No. 3 terminal and battery negative terminal to the No. 8 terminal of the PGM-FI main relay. Then check that there is continuity between the No. 5 terminal and No. 7 terminal of the PGM-FI main relay.

- If there is continuity, the relay is OK; If the fuel pump still does not work, go to Harness Testing on the next page.
- If there is no continuity, replace the relay and retest.

(cont'd)

# Fuel Supply System

## PGM-FI Main Relay (cont'd)

### Troubleshooting Flowchart

— Engine will not start.  
— Inspection of PGM-FI main relay and relay harness.

Disconnect the PGM-FI main relay connectors.

Check for continuity between BLK terminal ② and body ground.

Is there continuity?

NO

Repair open in BLK wire between PGM-FI main relay and G101 (located at thermostat housing).

YES

Measure the voltage between YEL/WHT terminal ① and body ground.

Is there battery voltage?

NO

— Replace ECU (ECM) (10 A) fuse (in the under-hood main fuse box).  
— Repair open in the YEL/WHT wire between the PGM-FI main relay and the ECU (ECM) (10 A) fuse.

YES

Turn the ignition switch ON.

Measure the voltage between BLK/YEL terminal ⑤ and body ground.

Is there battery voltage?

NO

— Replace No. 24 (15 A) fuse (in the under-dash fuse/relay box).  
— Repair open in the BLK/YEL wire between the PGM-FI main relay and the No. 24 (15 A) fuse.

YES

Turn the ignition switch to the START position.

NOTE:

- M/T: Clutch pedal must be depressed.
- A/T: Transmission in **N** or **P** position.

Measure the voltage between BLU/WHT terminal ④ and body ground.

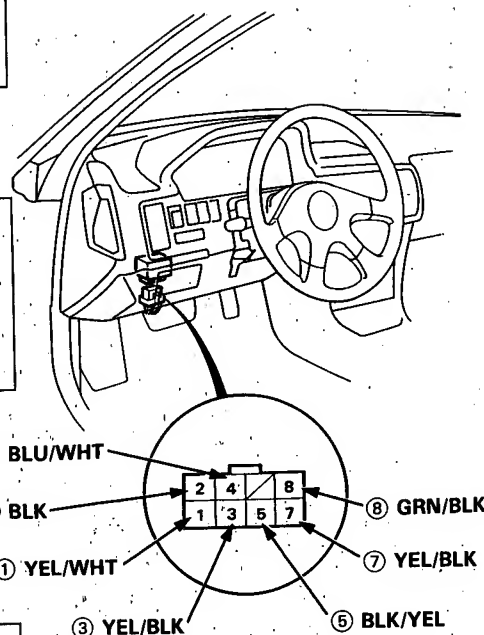
Is there battery voltage?

NO

Repair open in the BLU/WHT wire between the PGM-FI main relay and the No. 18 (7.5 A) fuse (in the under-dash fuse/relay box).

YES

(To page 11-121)







(From page 11-120)

Turn the ignition switch OFF.

Connect the test harness between the ECM and connectors. Disconnect "A" connector from the ECM only, not the main wire harness (see page 11-43).

Check for continuity between GRN/BLK terminal ⑧ and the following terminals; A7, A8.

Is there continuity?

NO

Repair open in GRN/BLK wire between ECM (A7, A8) and PGM-FI main relay.

YES

Reconnect "A" connector to the ECM.

Connect the PGM-FI main relay connector.

Turn the ignition switch ON.

Measure the voltage between A23 (-) terminal and the following terminals: A25 (+) B1 (+).

Is there battery voltage?

NO

— Repair open in the YEL/BLK wire ③ between the ECM (A25, B1) and PGM-FI main relay.  
— Replace PGM-FI main relay.

YES

Turn the ignition switch OFF.

Connect a voltmeter between A7 (+) terminal and A23 (-) terminal.

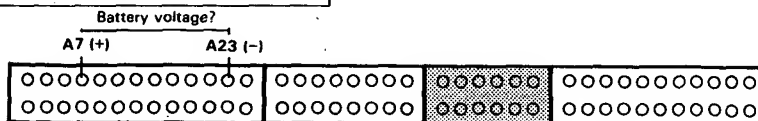
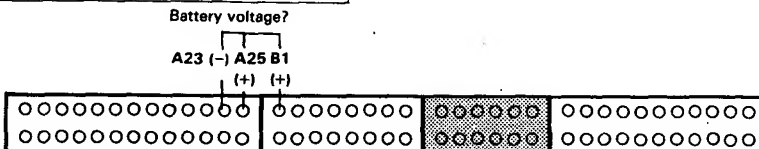
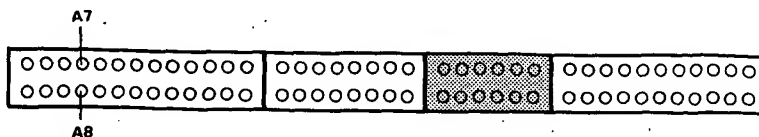
Is there battery voltage for two seconds when the ignition switch is first turned on?

YES

Substitute a known-good ECM and recheck. If symptom/indication goes away, replace the original ECM.

NO

Check the PGM-FI main relay (see page 11-119).



# Fuel Supply System

## Fuel Tank

### Replacement



**WARNING** Do not smoke while working on fuel system. Keep open flame away from your work area.

1. Block front wheels. Jack up the rear of the car and support with jackstands.
2. Remove the drain bolt and drain the fuel into an approved container.
3. Remove the rear seat and disconnect the 6P connector.
4. Remove the EVAP two way valve cover and fuel hose protector.
5. Disconnect the hoses.

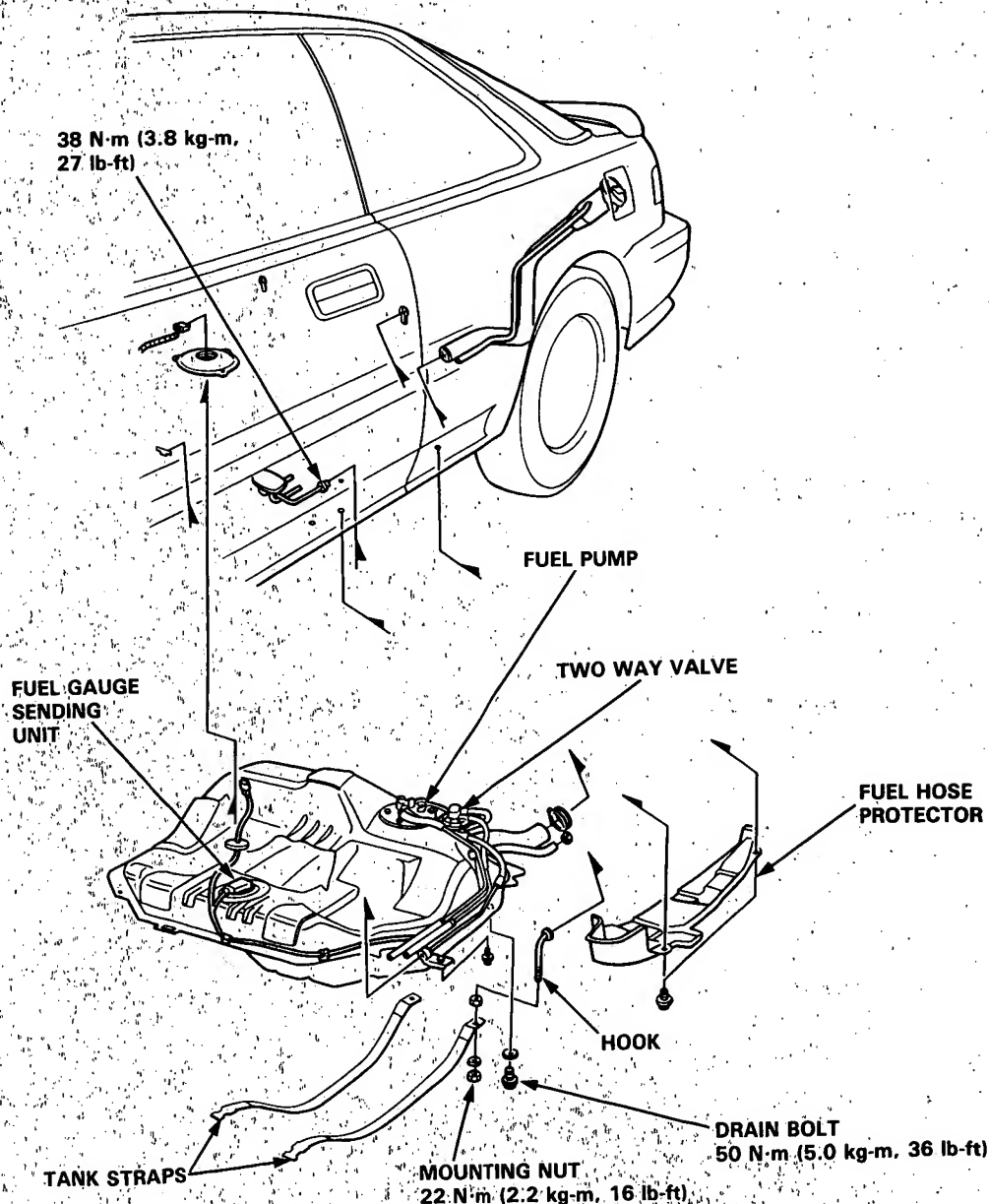
#### CAUTION:

- When disconnecting the hoses, slide back the clamps, then twist hoses as you pull, to avoid damaging them.
- Clean the flared joint of high pressure hoses thoroughly before reconnecting them.

6. Place a jack, or other support, under the tank.
7. Remove the strap nuts and let the straps fall free.
8. Remove the fuel tank.

NOTE: The tank may stick on the undercoat applied to its mount. To remove, carefully pry it off the mount.

9. Install a new washer on the drain bolt, then install parts in the reverse order of removal.



# Intake Air System



## System Troubleshooting Guide

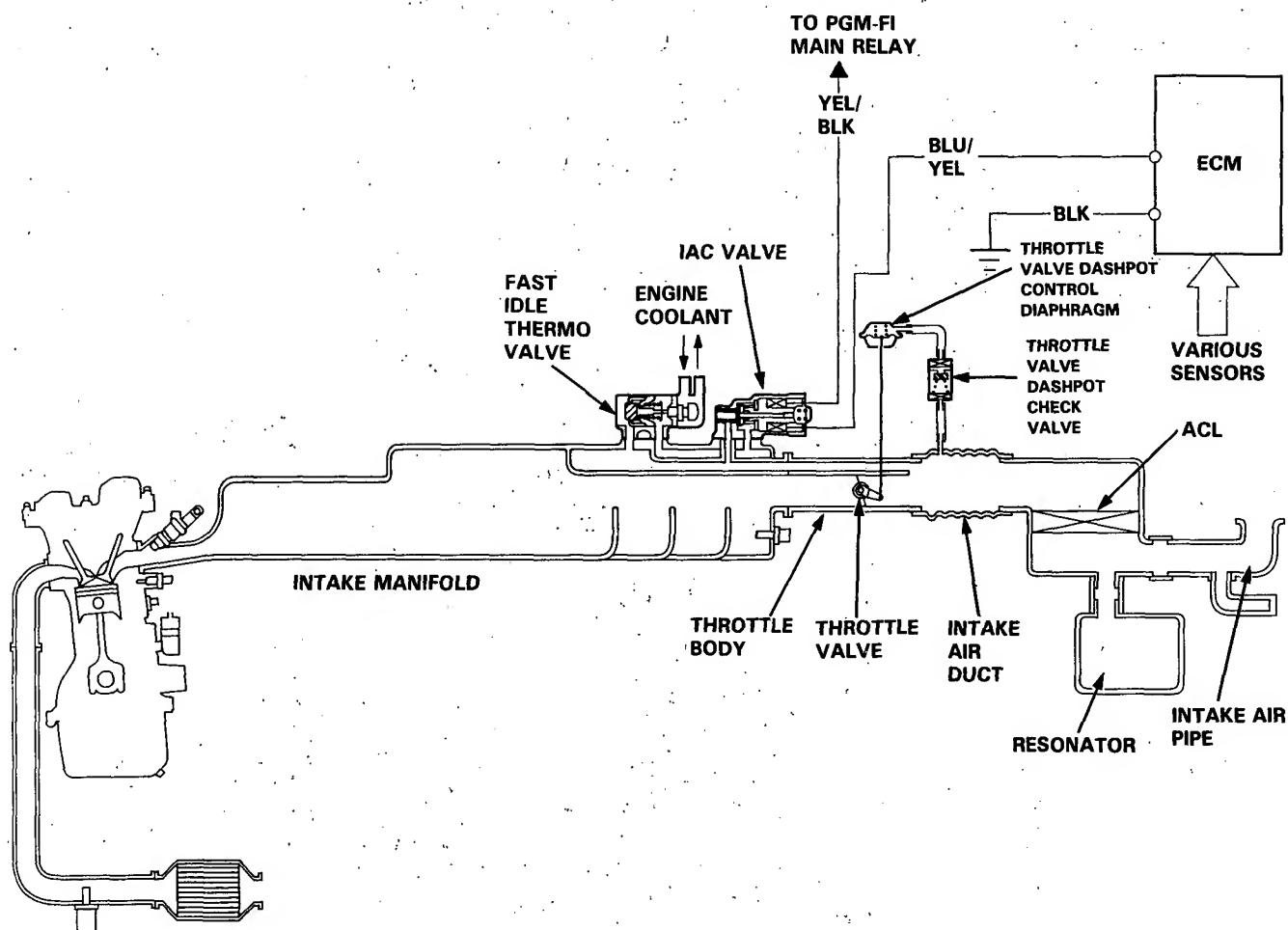
NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next system ②, etc.

PAGE	SUB-SYSTEM	THROTTLE CABLE	THROTTLE BODY	THROTTLE VALVE DASHPOT SYSTEM
SYMPTOM		126	127	130
WHEN COLD FAST IDLE OUT OF SPEC		③	②	①
WHEN WARM IDLE SPEED TOO HIGH		③	②	①
WHEN WARM IDLE SPEED TOO LOW			①	
FREQUENT STALLING WHILE WARMING UP			①	
LOSS OF POWER		①	②	

# Intake Air System

## System Description

The system supplies air for all engine needs. It consists of the Air Cleaner (ACL), intake air pipe, intake air duct, Throttle Body (TB), Idle Air Control (IAC) Valve, fast idle thermo valve, throttle valve dashpot system and intake manifold. A resonator in the intake air pipe provides additional silencing as air is drawn into the system.





## Air Cleaner (ACL)

### AIR CLEANER (ACL) ELEMENT Replacement

#### SUB-ACL ELEMENT

Replace every 2 years or 30,000 miles (48,000 km), whichever comes first.

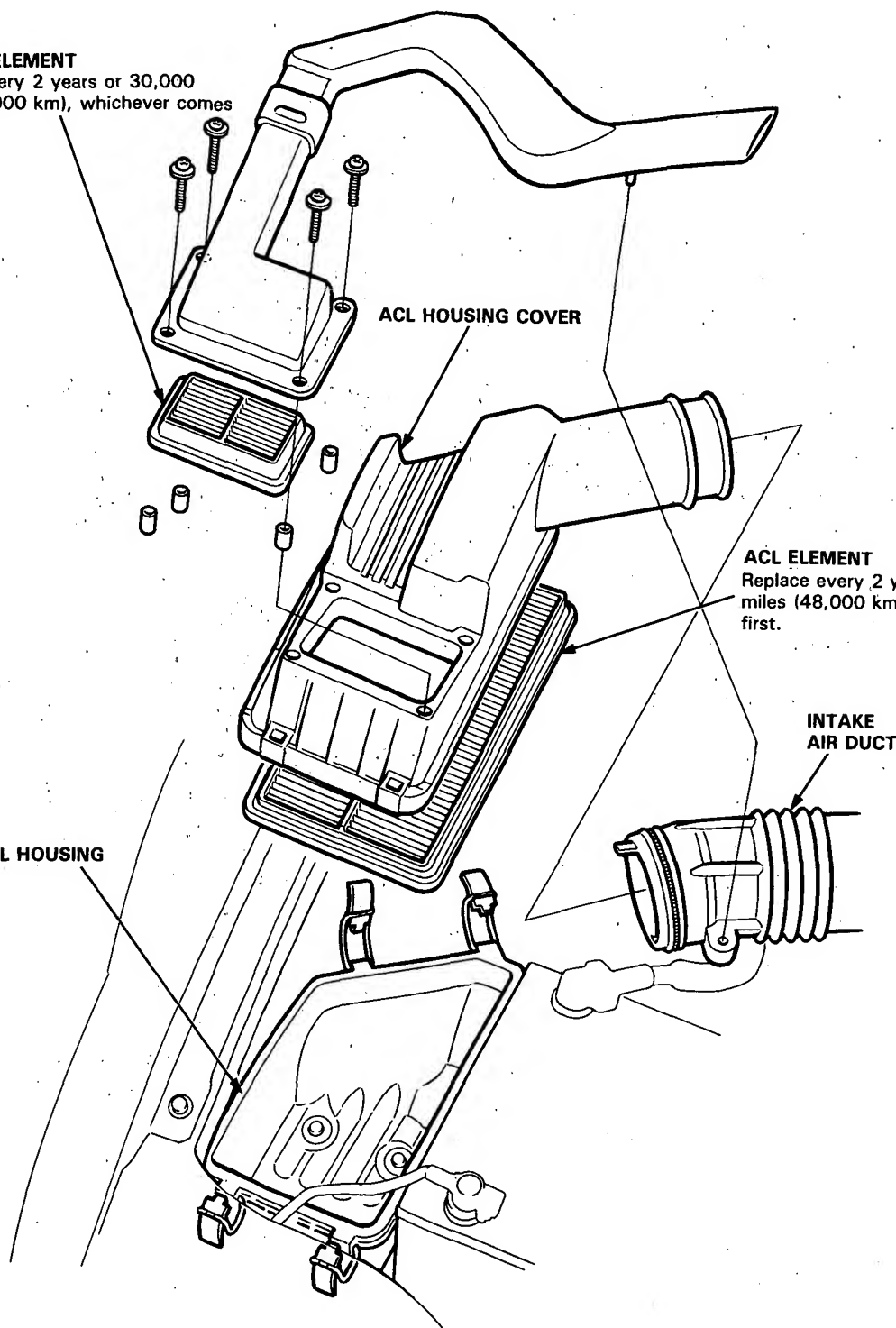
ACL HOUSING COVER

#### ACL ELEMENT

Replace every 2 years or 30,000 miles (48,000 km), whichever comes first.

INTAKE AIR DUCT

ACL HOUSING

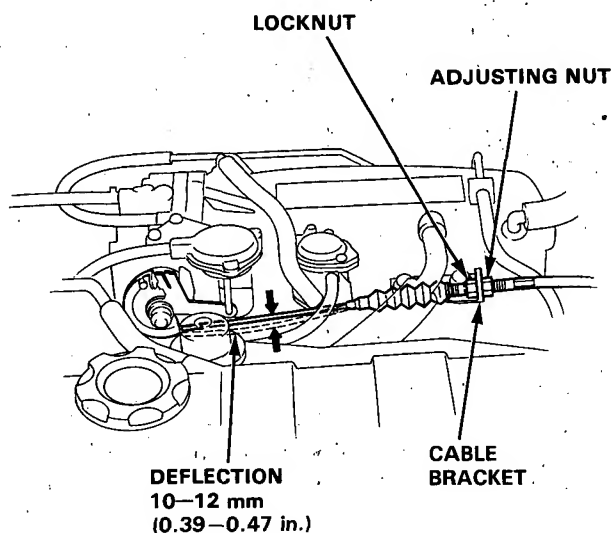


# Intake Air System

## Throttle Cable

### Inspection/Adjustment

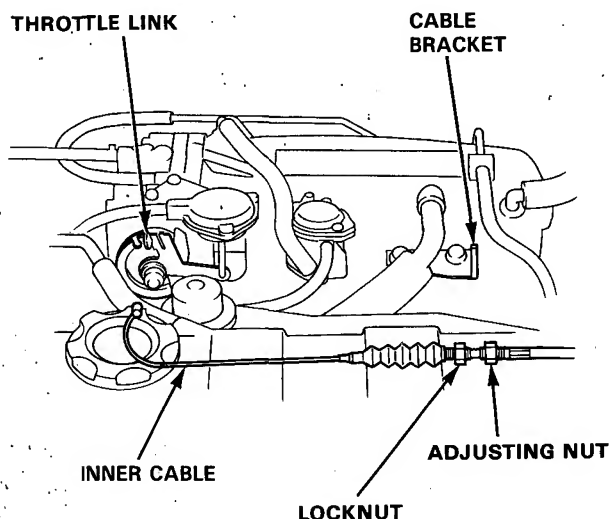
1. Warm up the engine to normal operating temperature (the radiator fan comes on).
2. Check that the throttle cable operates smoothly with no binding or sticking. Repair as necessary.
3. Check cable free play at the throttle linkage. Cable deflection should be 10–12 mm (0.39–0.47 in.)



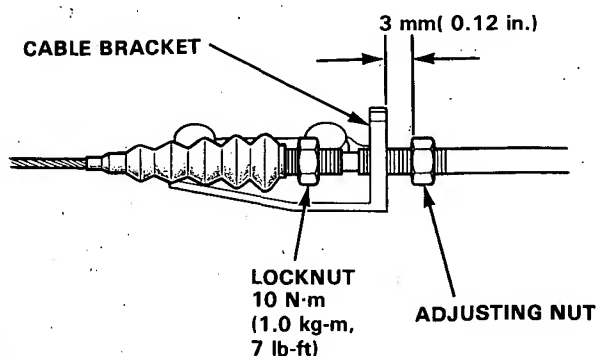
4. If deflection is not within specs, loosen the locknut and turn the adjusting nut until the deflection is as specified.
5. With the cable properly adjusted, check the throttle valve to be sure it opens fully when you push the accelerator pedal to the floor. Also check the throttle valve to be sure it returns to the idle position whenever you release the accelerator pedal.

### Installation

1. Fully open the throttle valve, then install the throttle cable in the throttle linkage and install the cable housing in the cable bracket.
2. Warm up the engine to normal operating temperature (the radiator fan comes on).



3. Hold the cable sheath, removing all slack from the cable.
4. Turn the adjusting nut until it is 3 mm (0.12 in.) away from the cable bracket.
5. Tighten the locknut. The cable deflection should now be 10–12 mm (0.39–0.47 in.). If not, see Inspection/Adjustment.

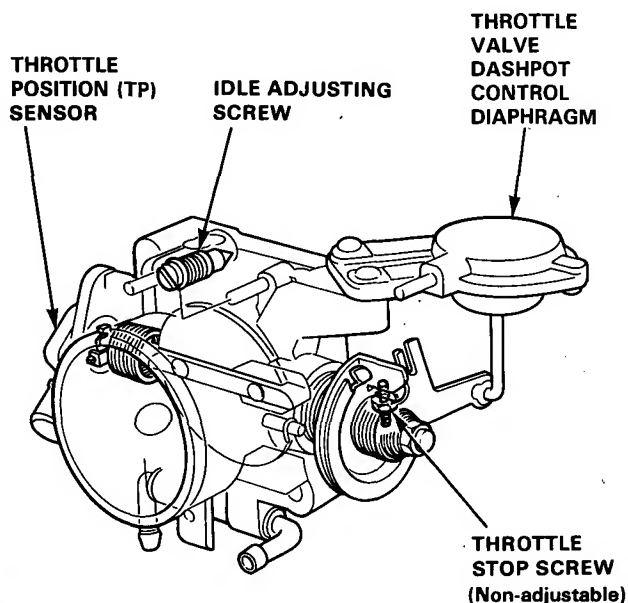




## Throttle Body

### Description

The throttle body is of the single-barrel side-draft type. The lower portion of the throttle valve is heated by engine coolant from the cylinder head. The idle adjusting screw which increases/decreases bypass air and the Evaporative Emission (EVAP) Control Canister port are located on the top of the throttle body. A throttle valve dashpot is used to slow the throttle valve as it approaches the close position.

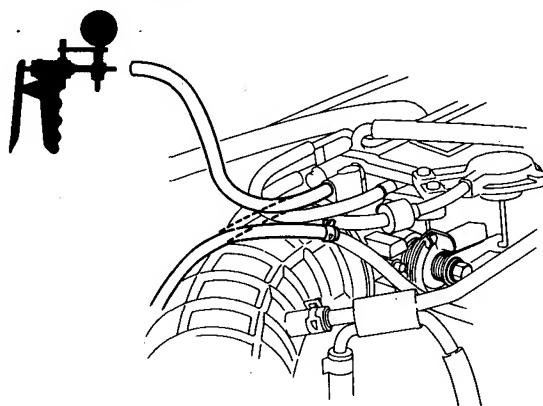


### Inspection

**CAUTION:** Do not adjust the throttle stop screw since it is preset at the factory.

1. Start the engine and allow to reach normal operating temperature (the radiator fan comes on).
2. Disconnect the vacuum hose (to the EVAP control canister) from the top of the throttle body; connect a vacuum, gauge to the throttle body.

VACUUM PUMP/GAUGE  
A973X-041-XXXXX



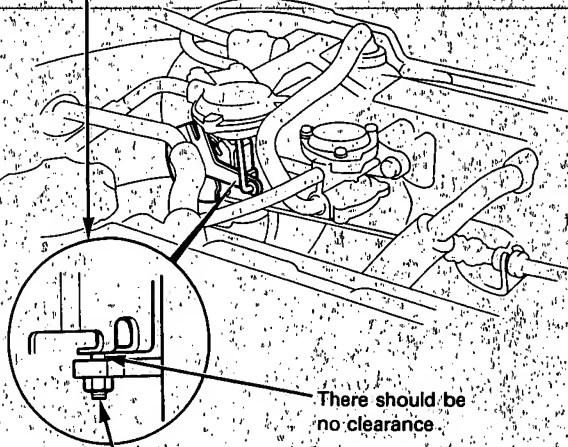
3. Allow the engine to idle and check that the gauge indicates no vacuum.
  - If there is vacuum, check the throttle valve dashpot system (see page 11-131).
4. Check that vacuum is indicated on the gauge when the throttle is opened slightly from idle.
  - If the gauge indicates no vacuum, check the throttle body port. If the throttle body port is clogged, clean it with carburetor cleaner.
5. Stop the engine and check that the throttle cable operates smoothly without binding or sticking.
  - If there are any abnormalities in the above steps, check for:
    - Excessive wear or play in the throttle valve shaft.
    - Sticky or binding throttle lever at full close position.
    - Clearance between throttle stop screw and throttle lever at full close position.

(cont'd)

# Intake Air System

## Throttle Body (cont'd)

THROTTLE LEVER



There should be  
no clearance

THROTTLE STOP SCREW  
(Non-adjustable)

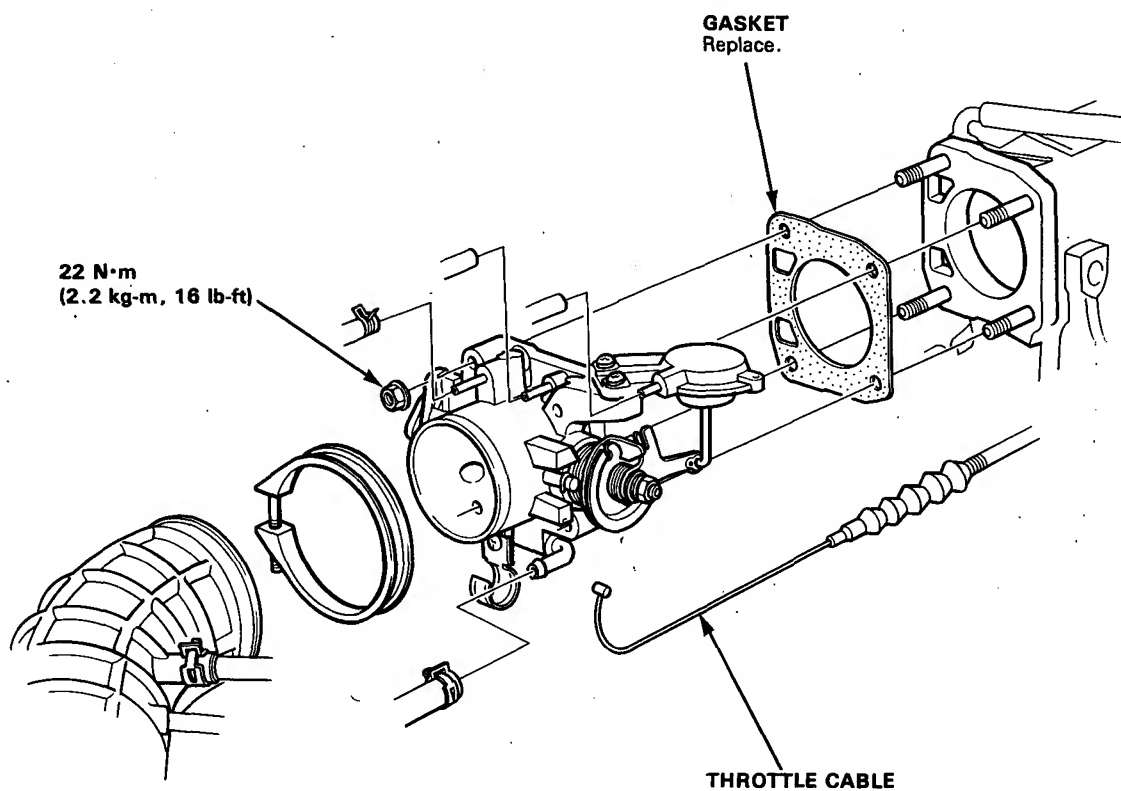
Replace the throttle body if there is excessive play in the throttle valve shaft or if the shaft is binding or sticking.





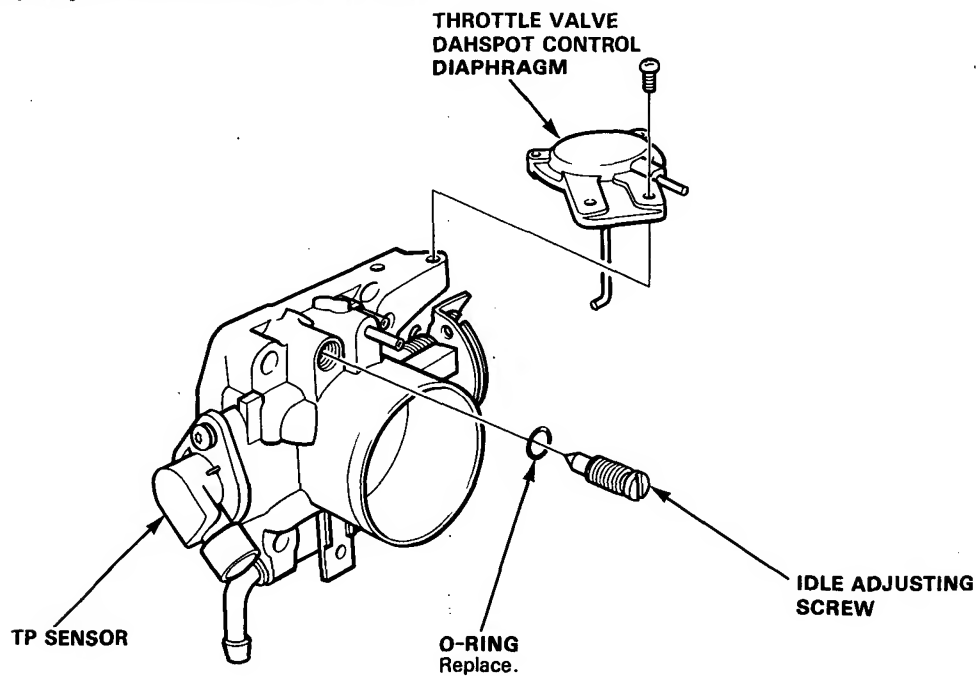
## Throttle Body

### Disassembly



### CAUTION:

- The throttle stop screw is non-adjustable.
- After reassembly, adjust the throttle cable (see page 11-126).

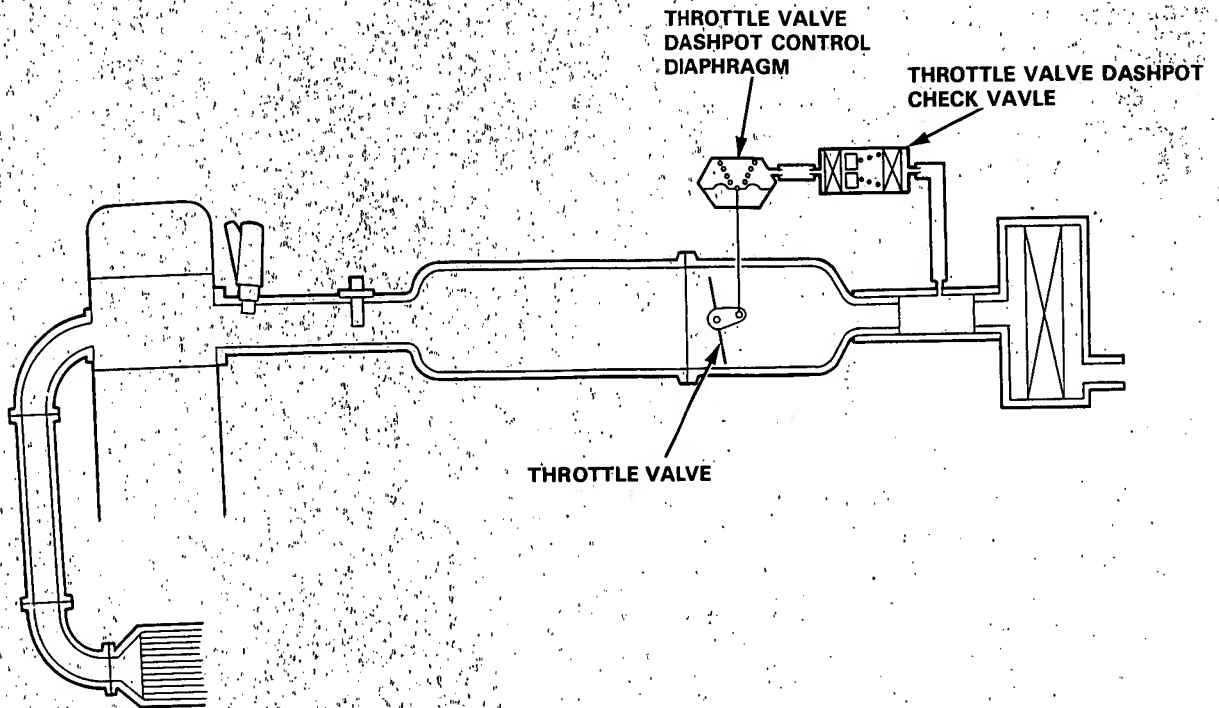


# Intake Air System

## Throttle Valve Dashpot System

### Description

The throttle valve dashpot is employed to slow the closing of the throttle valve when it is suddenly closed during gear shifting or deceleration.





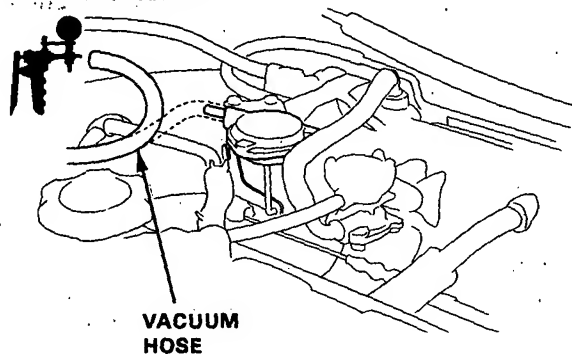
## Throttle Valve Dashpot System

### Testing

1. Disconnect vacuum hose from the throttle valve dashpot control diaphragm, and connect vacuum pump to the hose.

**VACUUM PUMP/  
GAUGE**

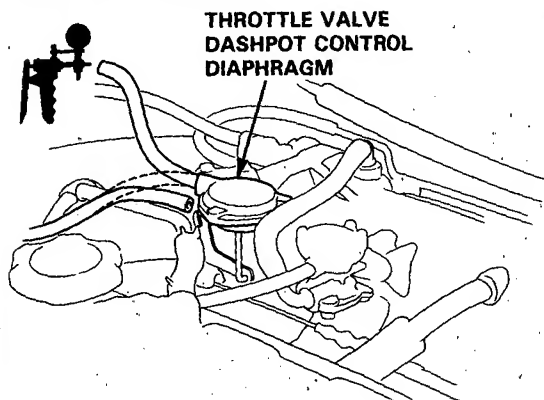
**A973X-041-XXXXX**



2. Apply vacuum and check that vacuum rises, then bleeds off to zero.

- If the vacuum holds or does not rise and bleed off, replace the throttle valve dashpot check valve and retest.

3. Connect a vacuum pump to the throttle valve dashpot control diaphragm.



4. Apply the vacuum and check that the rod pulls in and vacuum holds.

- If the vacuum does not hold or the rod does not move, replace the throttle valve dashpot control diaphragm, and retest.

# Emission Control System

## System Troubleshooting Guide

NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

Except B18A1 engine (A/T):

PAGE	SUB-SYSTEM	THREE WAY CATALYTIC CONVERTER	POSITIVE CRANKCASE VENTILATION SYSTEM	EVAPORATIVE EMISSION CONTROLS
SYMPTOM		134	142	143
ROUGH IDLE			①	
POOR PERFORMANCE	FAILS EMISSION TEST	①		②
	LOSS OF POWER	①		

B18A1 engine (A/T):

PAGE	SUB-SYSTEM	THREE WAY CATALYTIC CONVERTER	EXHAUST GAS RECIRCULATION SYSTEM	POSITIVE CRANKCASE VENTILATION SYSTEM	EVAPORATIVE EMISSION CONTROLS
SYMPTOM		134	136	142	143
ROUGH IDLE			①	②	
FREQUENT STALLING	WHILE WARM-ING UP		①		
	AFTER WARM-ING UP		①		
POOR PERFORMANCE	FAILS EMISSION TEST	①	③		②
	LOSS OF POWER	①	②		



## System Description

The emission control system includes a Three Way Catalytic Converter (TWC), \*Exhaust Gas Recirculation (EGR) system, Positive Crankcase Ventilation (PCV) system and Evaporative Emission (EVAP) Control system. The emission control system is designed to meet federal and state emission standards.

\*: B18A1 engine (A/T):

## Tailpipe Emission

### Inspection

**⚠ WARNING** Do not smoke during this procedure. Keep any open flame away from your work area.

1. Start the engine and warm up to normal operating temperature (the radiator fan comes on).
2. Connect a tachometer.
3. Check and adjust the idle speed, if necessary (see page 11-103).
4. Warm up and calibrate the CO meter according to the meter manufacturer's instructions.
5. Check idle CO with the headlights, heater blower, rear window defogger, cooling fan, and air conditioner off.

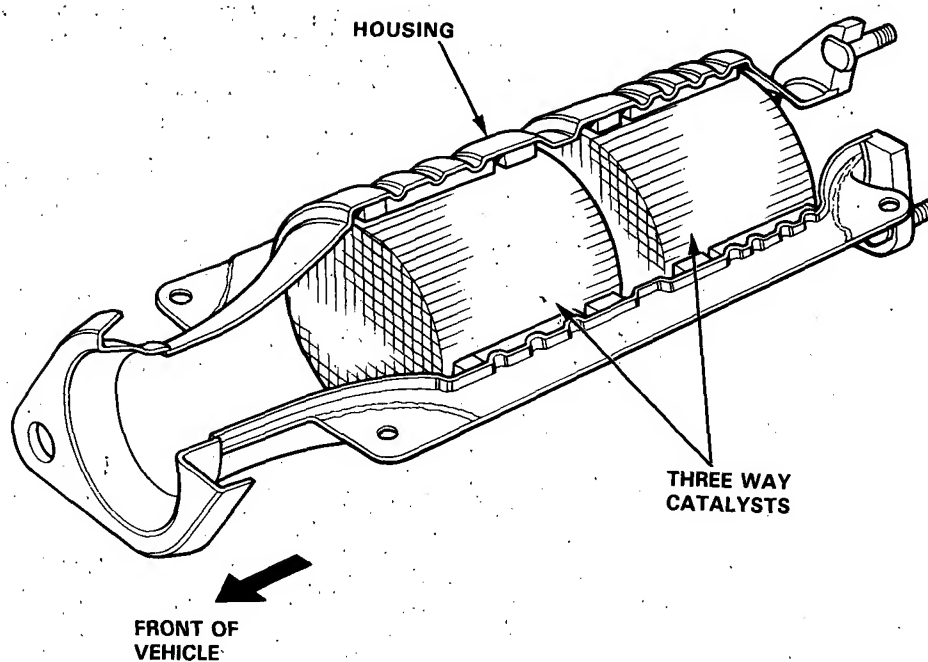
CO meter should indicate 0.1 % maximum.

# Emission Control System

## Three Way Catalytic Converter (TWC)

### Description

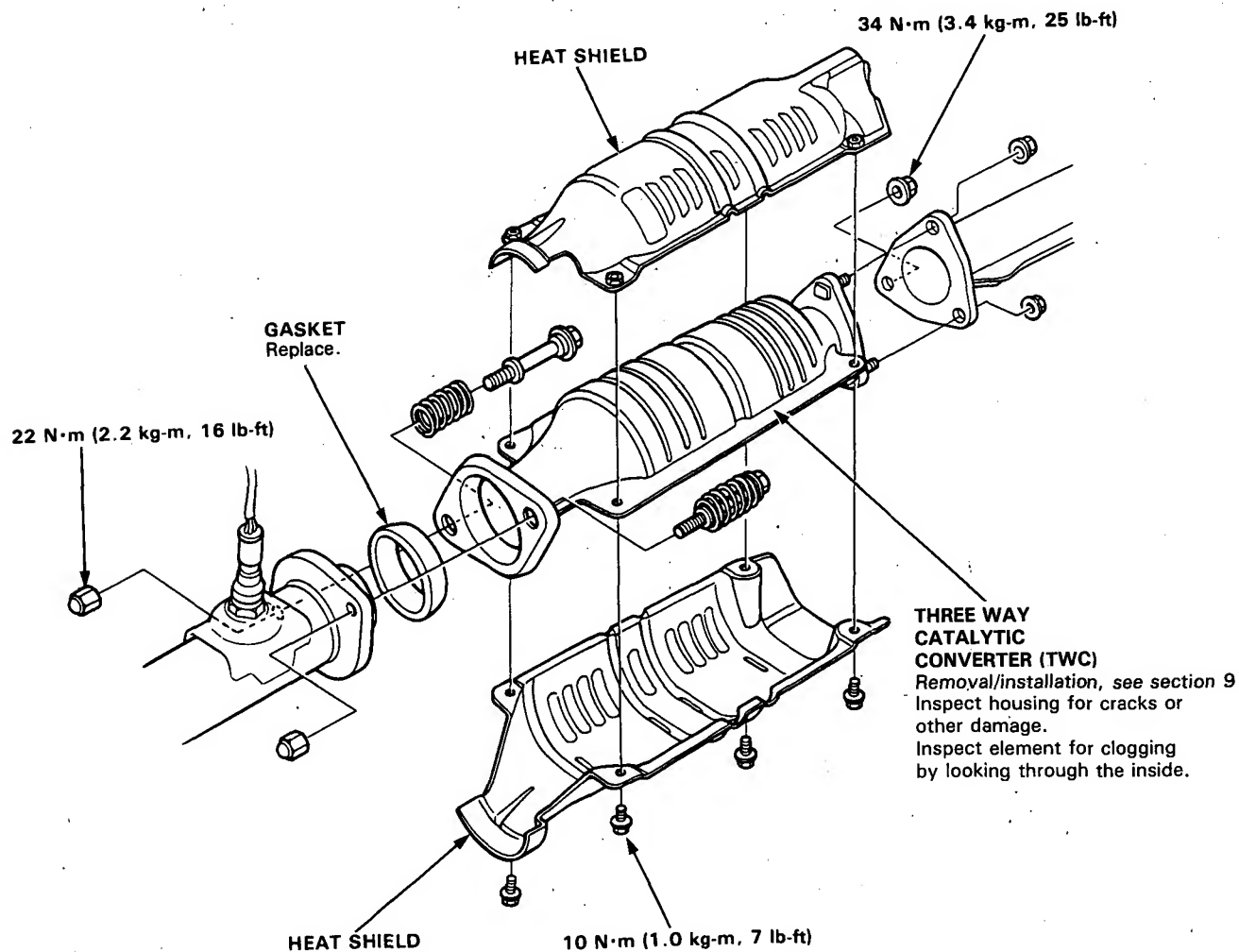
The Three Way Catalytic Converter (TWC) is used to convert hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas, to carbon dioxide (CO<sub>2</sub>), dinitrogen (N<sub>2</sub>) and water vapor.





### Inspection


If excessive exhaust system back-pressure is suspected, remove the TWC from the car and make a visual check for plugging, melting or cracking of the catalyst. Replace the TWC if any of the visible area is damaged or plugged.



# Emission Control System

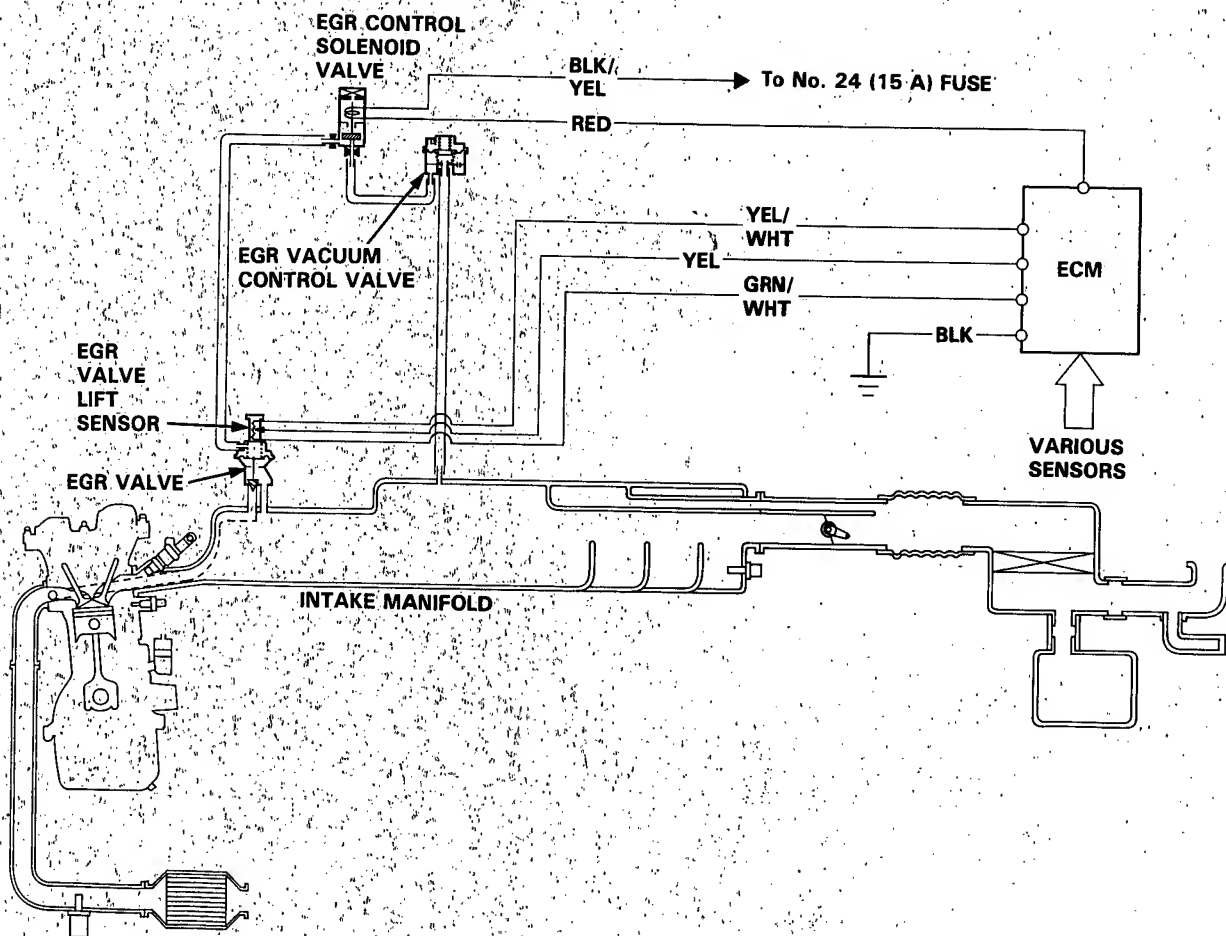
## Exhaust Gas Recirculation (EGR) System [B18A1 engine: A/T]

### Troubleshooting Flowchart

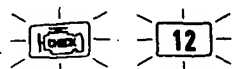
 **12** The Malfunction Indicator Lamp (MIL) indicates Diagnostic Trouble Code (DTC) 12: A problem in the Exhaust Gas Recirculation (EGR) system.

The EGR System is designed to reduce oxides of nitrogen emissions (NOx) by recirculating exhaust gas through the EGR valve and the intake manifold into the combustion chambers. It is comprised of the EGR valve, EGR vacuum control valve, EGR control solenoid valve, ECM and various sensors.

The ECM memory contains ideal EGR valve lifts for varying operating conditions. The EGR valve lift sensor detects the amount EGR valve lift and sends the information to the ECM. The ECM then compares it with the ideal EGR valve lift which is determined by signals sent from the other sensors. If there is any difference between the two, the ECM current to the EGR control solenoid valve to further regulate vacuum applied to the EGR valve.







- The MIL has been reported on.
- With service check connector jumped (see page 11-40), code 12 is indicated.

Do the ECM Reset Procedure (see page 11-41).

Road test necessary: Warm up the engine to normal operating temperature (the radiator fan comes on). Drive the car on the road for approx. 10 minutes. With the transmission in low gear, keep the engine speed in the 1,700–2,500 rpm.

Is the MIL on and does it indicate code 12?

NO

YES

With the engine at idle, disconnect the #16 hose from the EGR valve and connect a vacuum pump/gauge to the hose.

Is there any vacuum?

YES

NO

Move the vacuum pump/gauge to the EGR valve.

Intermittent failure, system is OK as this time.  
Check for poor connections or loose wires at C216 (located at right shock tower), C317 (located at left shock tower), C105 (EGR valve), C223 (control box), and ECM.

#16 HOSE

VACUUM PUMP/  
GAUGE  
A973X-041-XXXX

EGR VALVE

Disconnect 4P connector from the control box and check the #16 hose for vacuum again.

#16 HOSE

EGR VALVE

RED

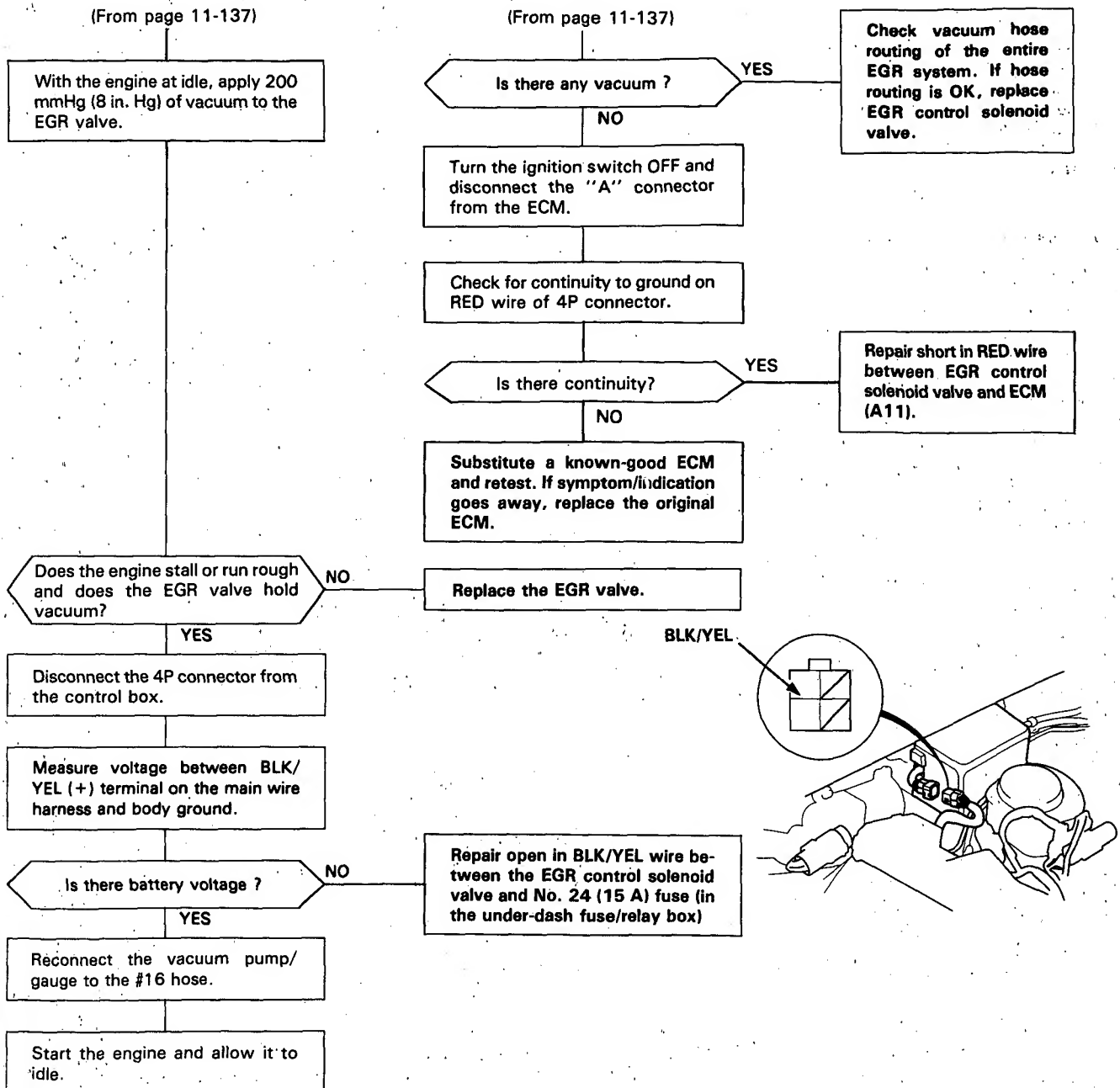
(To page 11-138)

(To page 11-138)

(cont'd)

# Emission Control System

## Exhaust Gas Recirculation (EGR) System [B18A1 engine: A/T] (cont'd)



(To page 11-139)



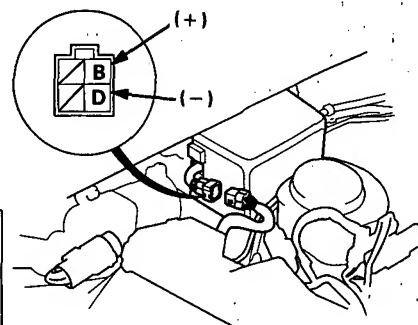
(From page 11-138)

Connect the battery positive terminal to the B terminal of the 4P connector. While watching the vacuum gauge, connect the battery negative terminal to the D terminal.

Is there approx. 200 mmHg (8 in. Hg) within 1 second?

NO

Turn the ignition switch OFF and inspect the #16 and #10 hoses for leaks, restrictions, or misrouting.



YES

Turn the ignition switch OFF and reconnect the 2P connector to the EGR control solenoid valve.

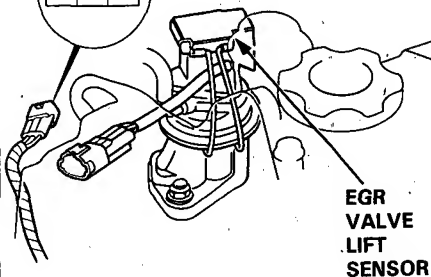
Are the hoses OK?

NO

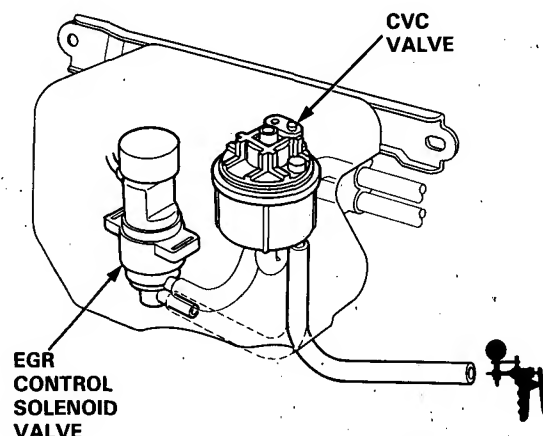
Correct as necessary.

YES

YEL/  
WHT YEL GRN/  
WHT



EGR  
VALVE  
LIFT  
SENSOR



EGR  
CONTROL  
SOLENOID  
VALVE

CVC  
VALVE

VACUUM  
PUMP/GAUGE  
A973X-041-XXXXX

Disconnect the lower hose on EGR control solenoid valve and connect a vacuum gauge to the hose.

Start the engine and allow it to idle.

Is there 150–200 mmHg (6–10 in. Hg) of vacuum?

NO

Replace the EGR vacuum control valve.

YES

Replace the EGR control solenoid valve.

Disconnect 3P connector from the EGR valve lift sensor.

Turn the ignition switch ON.

Measure voltage between YEL/WHT (+) terminal and GRN/WHT (–) terminal.

Is there approx. 5 V?

NO

Measure voltage between YEL/WHT (+) terminal and body ground.

YES

(To page 11-140)

(To page 11-140)

(cont'd)

# Emission Control System

## Exhaust Gas Recirculation (EGR) System [B18A1 engine: A/T]

(From page 11-139)

(From page 11-139)

Is there approx. 5 V?

YES

Repair open in GRN/  
WHT wire between  
EGR valve and ECM  
(D22).

NO

Connect the test harness "D"  
connector to the ECM only, not to  
the main wire harness (see page  
11-43).

Turn the ignition switch ON.

Measure voltage between D20  
(+) terminal and D22 (-) ter-  
minal.

Is there approx. 5 V?

YES

Repair open in YEL/  
WHT wire between  
EGR valve and ECM  
(D20).

NO

Substitute a known-good ECM  
and recheck. If prescribed voltage  
is now available, replace the origi-  
nal ECM.

Turn the ignition switch OFF.

Reconnect the 3P connector to  
the EGR valve lift sensor.

Connect the test harness between  
the ECM and connector (see page  
11-43).

Turn the ignition switch ON.

Measure voltage between D12  
(+) terminal and D22 (-) ter-  
minal.

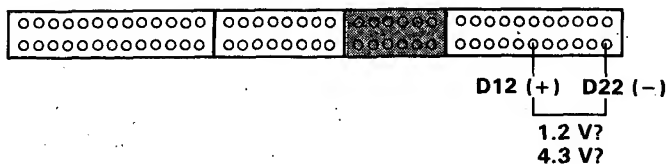
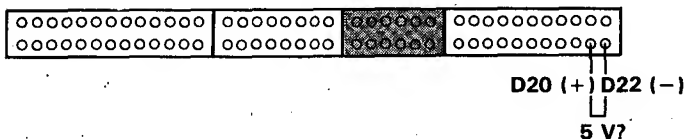
Is the voltage approx. 1.2 V with  
no vacuum applied and approx.  
4.3 V with 200 mmHg (8 in. Hg)  
of vacuum applied (to the EGR  
valve)?

NO

- Repair open or short in YEL  
wire between EGR valve and  
ECM (D12).
- If wire is OK, replace the EGR  
valve.

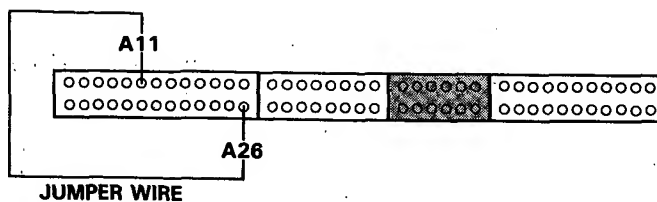
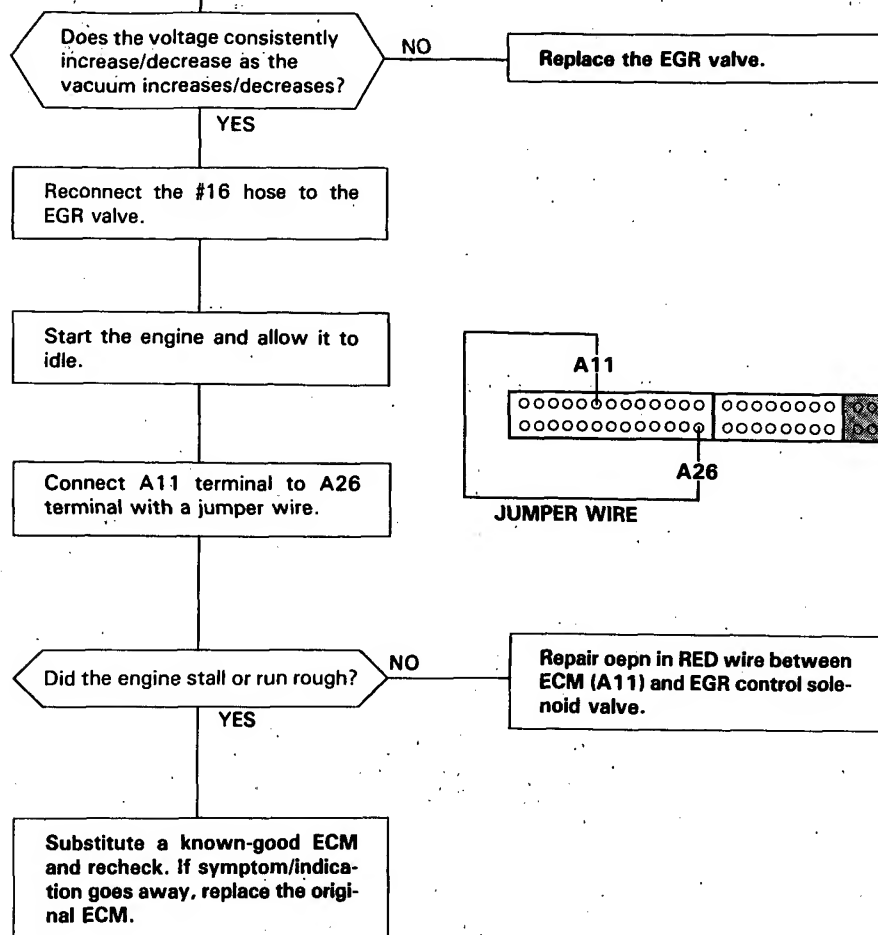
YES

(To page 11-141)





(From page 11-140)

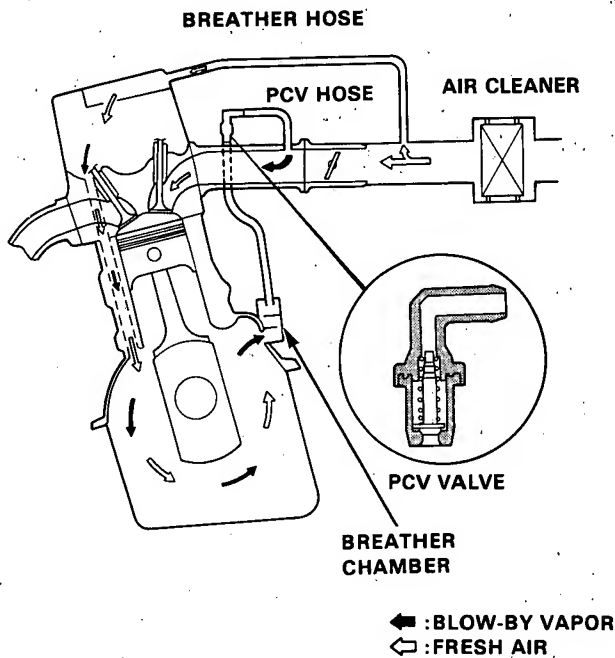


# Emission Control System

## Positive Crankcase Ventilation (PCV) System

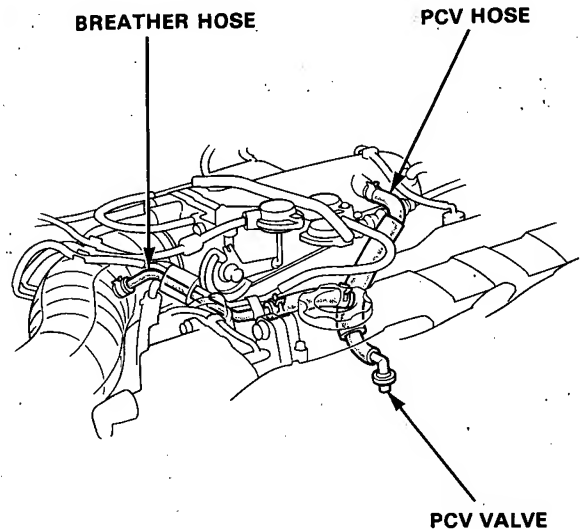
### Description

The Positive Crankcase Ventilation (PCV) system is designed to prevent blow-by gas from escaping to the atmosphere. The PCV valve contains a spring-loaded plunger. When the engine starts, the plunger in the PCV valve is lifted in proportion to intake manifold vacuum and the blow-by gas is drawn directly into the intake manifold.

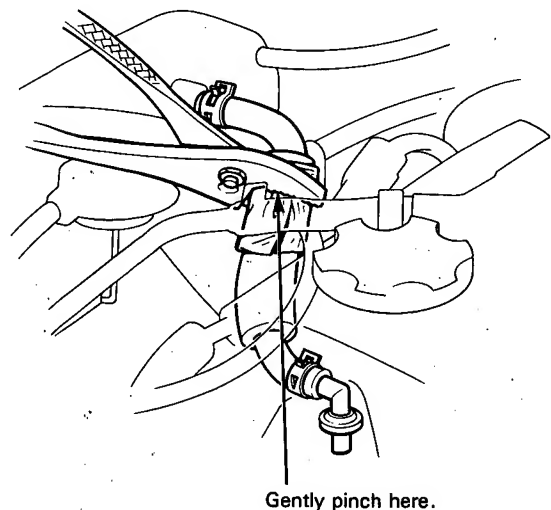


### Inspection

1. Check the PCV hoses and connections for leaks and clogging.



2. At idle, make sure there is a clicking sound from the PCV valve when the hose between PCV valve and intake manifold is lightly pinched with your fingers or pliers.



- If there is no clicking sound, check the PCV valve grommet for cracks or damage. If the grommet is OK, replace the PCV valve and recheck.



## Evaporative Emission (EVAP) Controls

### Description

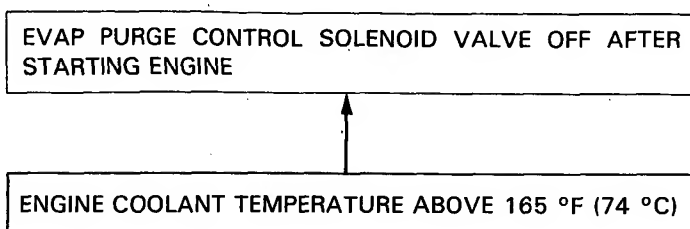
The evaporative emission controls are designed to minimize the amount of fuel vapor escaping to the atmosphere. The system consists of the following components:

#### A. Evaporative Emission (EVAP) Control Canister

An EVAP control canister is used for the temporary storage of fuel vapor until the fuel vapor can be purged from the EVAP control canister into the engine and burned.

#### B. Vapor Purge Control System

EVAP control canister purging is accomplished by drawing fresh air through the EVAP control canister and into a port on the throttle body. The purging vacuum is controlled by the EVAP purge control diaphragm valve and the EVAP purge control solenoid valve.



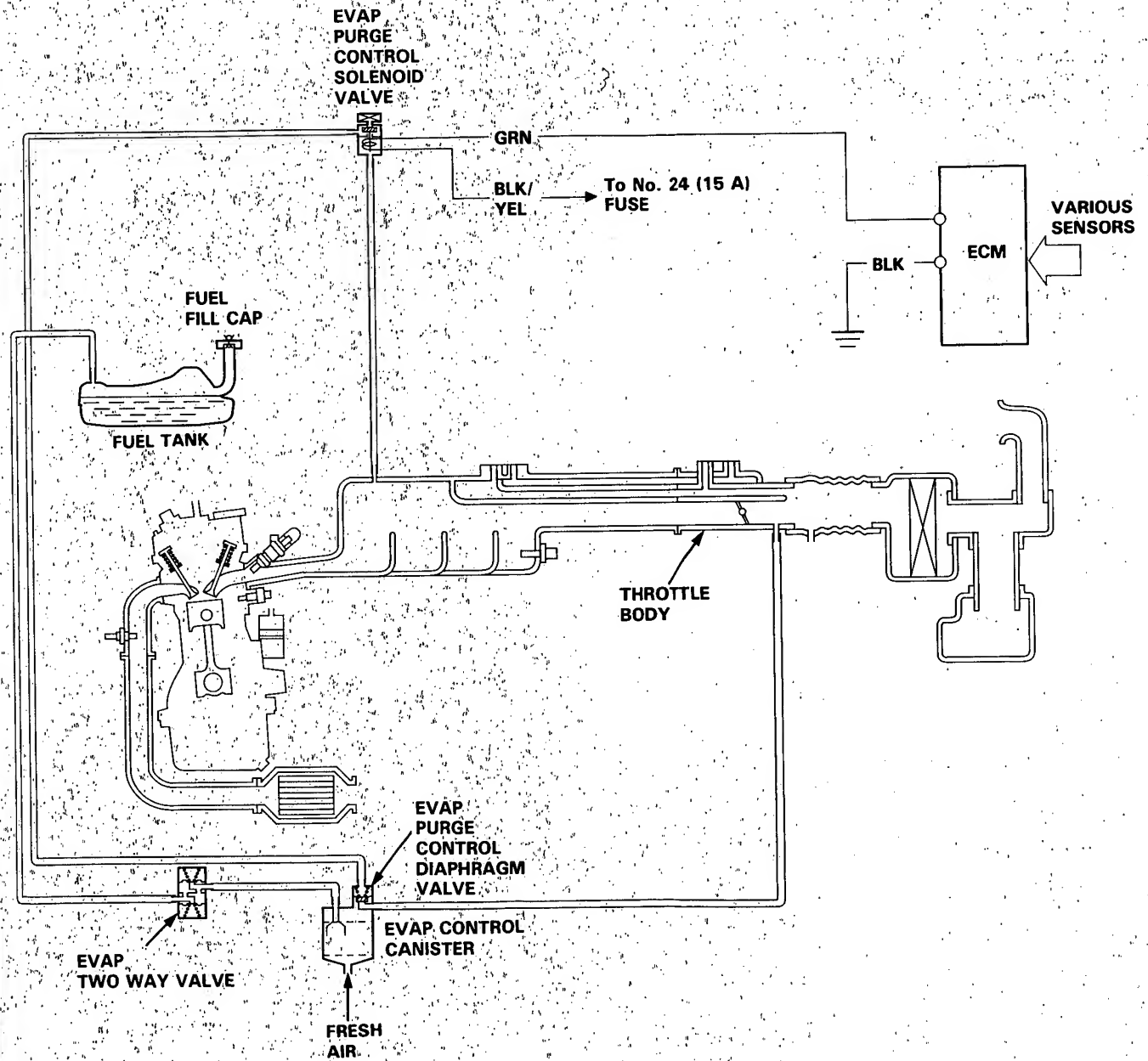
#### C. Fuel Tank Vapor Control System

When fuel vapor pressure in the fuel tank is higher than the set value of the EVAP two way valve, the valve opens and regulates the flow of fuel vapor to the EVAP control canister.

(cont'd)

# Emission Control System

## Evaporative Emission (EVAP) Control (cont'd)







## Troubleshooting Flowchart

### Inspection of Evaporative Emission Controls

Disconnect #7 vacuum hose from the EVAP purge control diaphragm valve (on the EVAP control canister) and connect a vacuum gauge to the hose.

Start the engine and allow it to idle.  
NOTE: Engine coolant temperature must be below 165 °F (74 °C)

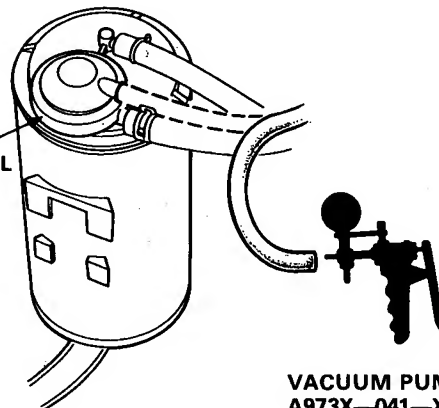
Is there vacuum ?

YES

NO

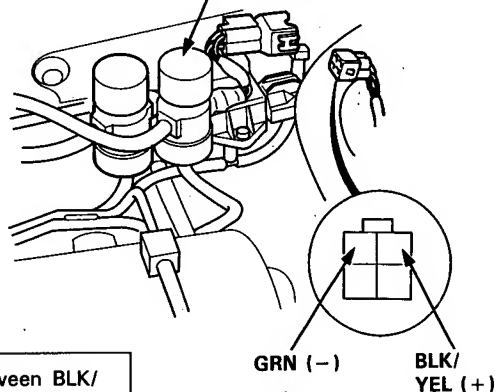
(To page 11-146)

EVAP PURGE CONTROL SOLENOID VALVE



VACUUM PUMP/GAUGE  
A973X-041-XXXXX

EVAP PURGE CONTROL DIAPHRAGM VALVE



Disconnect the 4P (B17A1 engine: 2P) connector from the purge control solenoid valve.

Measure voltage between BLK/YEL (+) terminal and GRN (-) terminal.

Is there battery voltage ?

YES

NO

Measure voltage between BLK/YEL (+) terminal body ground.

(To page 11-146)

Inspect vacuum hose routing.  
If OK, replace EVAP purge control solenoid valve.

(cont'd)

# Emission Control System

## Evaporative Emission (EVAP) Controls (cont'd)

(From page 11-145)

(From page 11-145)

Warm up the engine to normal operating temperature (the radiator fan comes on).

Is there battery voltage?

NO

Repair open in BLK/YEL wire between No. 24 (15 A) fuse and the solenoid valve.

YES

Inspect GRN wire for an open to body ground between ECM (A20) and the connector. If wire is OK, substitute a known-good ECM and recheck. If symptom goes away, replace the original ECM.

Check for vacuum at #7 vacuum hose after starting the engine.

Is there manifold vacuum?

NO

Disconnect the 4P (B17A1 engine: 2P) connector.

YES

Is there manifold vacuum?

NO

Inspect vacuum hose routing. If OK, replace the EVAP purge control solenoid valve.

YES

Inspect for a short in GRN wire between ECM (A20) and the connector. If wire is OK, substitute a known-good ECM and recheck. If symptom goes away, replace the original ECM.

Reconnect the hose.

Remove fuel fill cap.

(To page 11-147)



(From page 11-146)

Connect a vacuum gauge to canister purge air hose.

Start the engine and raise speed to 3,500 rpm.

Does vacuum appear on gauge within 1 minute?

NO

YES

See EVAP two way valve test to complete. Evaporative emission controls are OK.

Connect a vacuum gauge to the canister purge hose and raise the engine speed to 3,500 rpm.

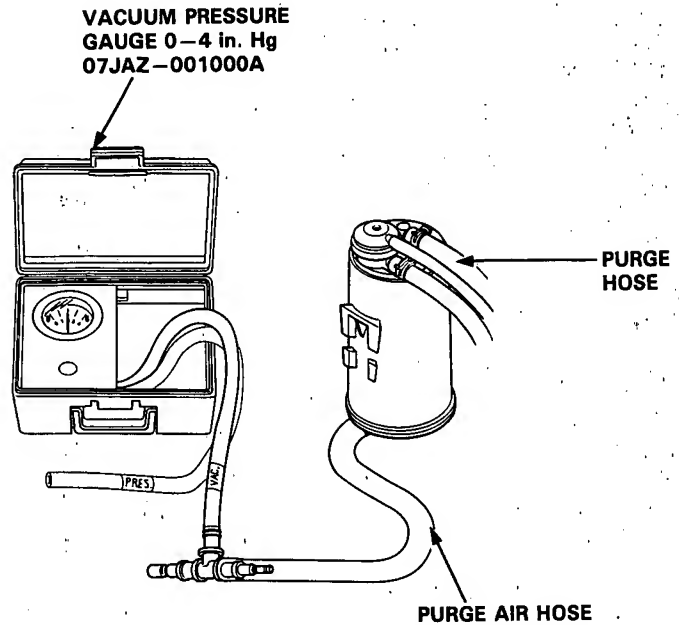
Does vacuum appear on the gauge?

NO

YES

Replace the EVAP control canister.

Inspect the purge hose and throttle body port for pinch or blockage.



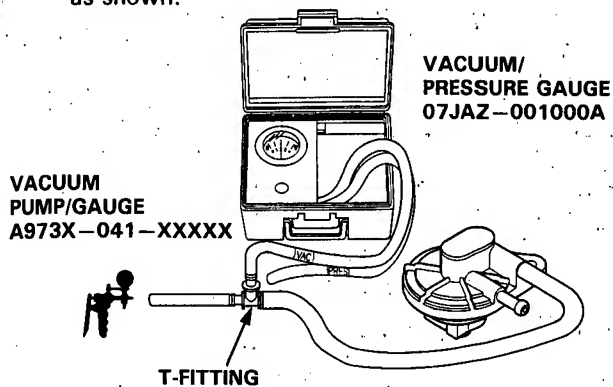
(cont'd)

# Emission Control System

## Evaporative Emission Controls (cont'd)

### Evaporative Emission (EVAP) Two Way Valve Testing

1. Remove the fuel fill cap.
2. Remove vapor line from the fuel tank and connect to T-fitting from vacuum gauge and vacuum pump as shown.

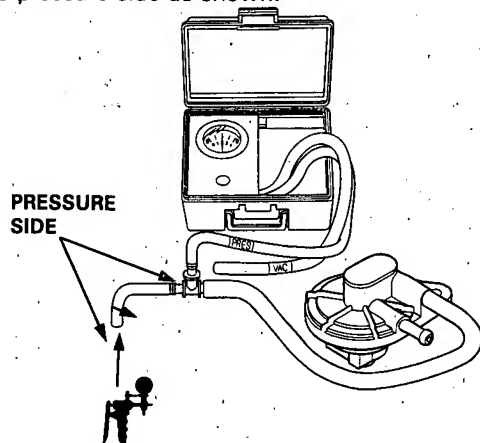


3. Apply vacuum slowly and continuously while watching the gauge.

Vacuum should stabilize momentarily at 5 to 15 mmHg (0.2 to 0.6 in. Hg).

- If vacuum stabilizes (valve opens) below 5 mmHg (0.2 in. Hg) or above 15 mmHg (0.6 in. Hg), install a new valve and retest.

4. Move vacuum pump hose from vacuum to pressure fitting, and move vacuum gauge hose from vacuum to pressure side as shown.



5. Slowly pressurize the vapor line while watching the gauge.

Pressure should stabilize at 10 to 35 mmHg (0.4 to 1.4 in. Hg).

- If pressure momentarily stabilizes (valve opens) at 10 to 35 mmHg (0.4 to 1.4 in. Hg), the valve is OK.
- If pressure stabilizes below 10 mmHg (0.4 in. Hg) or above 35 mmHg (1.4 in. Hg), install a new valve and retest.

## **Transaxle**

<b>Clutch .....</b>	<b>12-1</b>
<b>Manual Transmission .....</b>	<b>13-1</b>
<b>Automatic Transmission .....</b>	<b>14-1</b>
<b>Differential</b>	
<b>Manual Transmission .....</b>	<b>15-1</b>
<b>Automatic Transmission .....</b>	<b>15-9</b>
<b>Driveshafts .....</b>	<b>16-1</b>





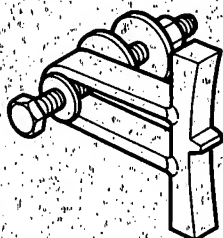
## **Clutch**

<b>Special Tools .....</b>	<b>12-2</b>
<b>Illustrated Index .....</b>	<b>12-3</b>
<b>Clutch Pedal</b>	
<b>Adjustment (without Cruise         Control System) .....</b>	<b>12-4</b>
<b>Adjustment (with Cruise         Control System) .....</b>	<b>12-5</b>
<b>Release Bearing</b>	
<b>Removal .....</b>	<b>12-6</b>
<b>Inspection .....</b>	<b>12-6</b>
<b>Installation .....</b>	<b>12-7</b>
<b>Pressure Plate</b>	
<b>Removal/Inspection .....</b>	<b>12-8</b>
<b>Clutch Disc</b>	
<b>Inspection .....</b>	<b>12-9</b>
<b>Flywheel, Flywheel Bearing</b>	
<b>Inspection .....</b>	<b>12-10</b>
<b>Replacement .....</b>	<b>12-10</b>
<b>Clutch Assembly</b>	
<b>Installation .....</b>	<b>12-11</b>

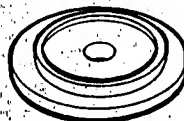


# Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07LAB—PV00100 or 07924—PD20003	Ring Gear Holder	1	12-8, 10, 11
②	07JAF—PM7011A	Clutch Alignment Disc	1	12-8
③	07LAF—PR30210	Clutch Alignment Shaft	1	12-8, 11
④	07746—0010100	Attachment, 32 x 35 mm	1	12-10
⑤	07749—0010000	Driver	1	12-10
⑥	07936—3710100	Handle	1	12-8, 11



①



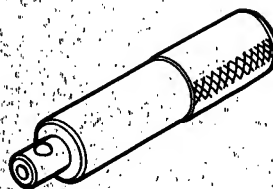
②



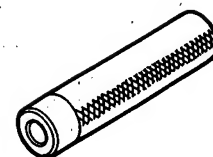
③



④



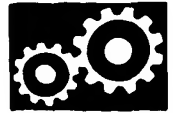
⑤



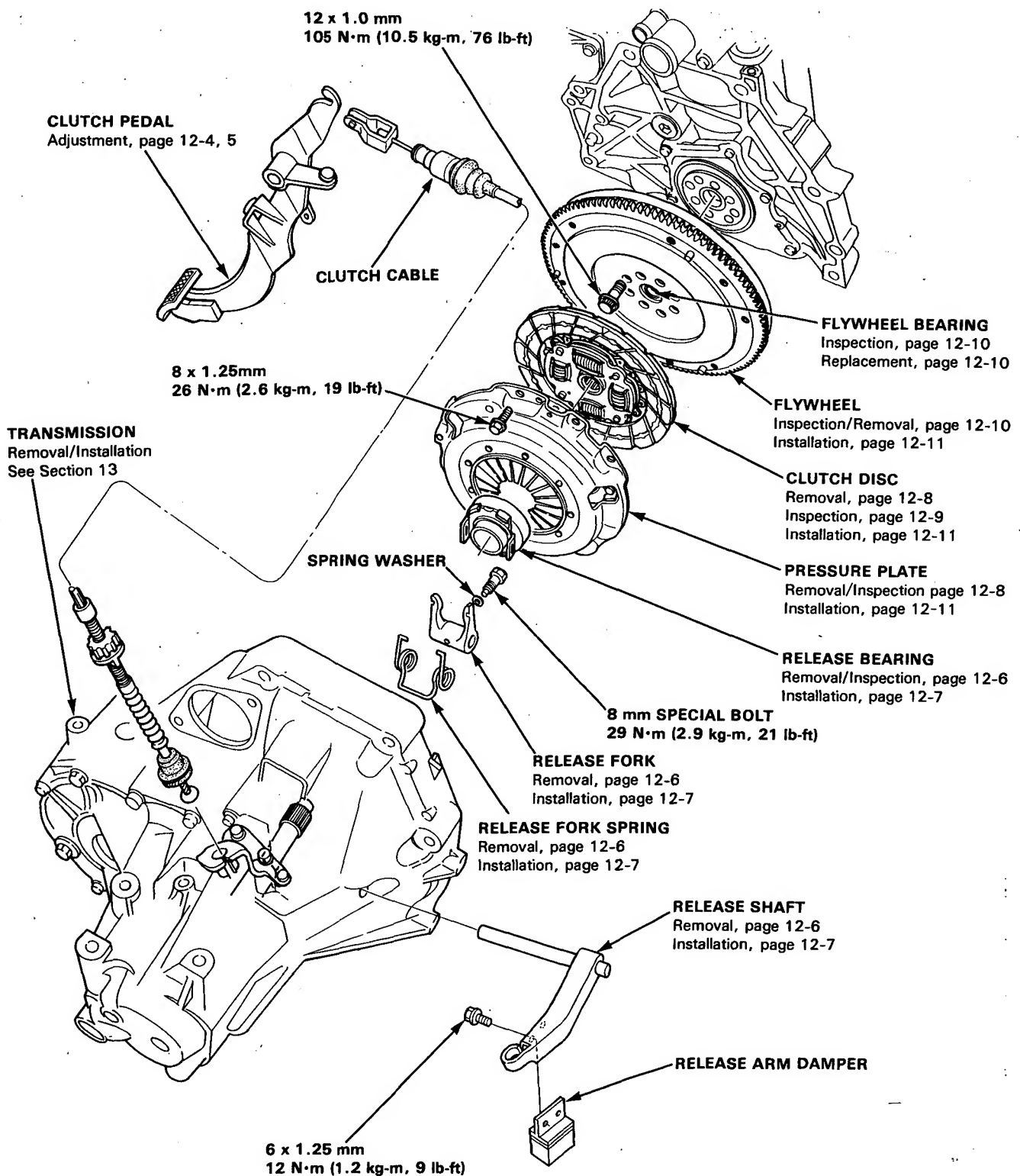
⑥



# Illustrated Index



**NOTE:** Whenever the transmission is removed, clean and grease the release bearing sliding surface.



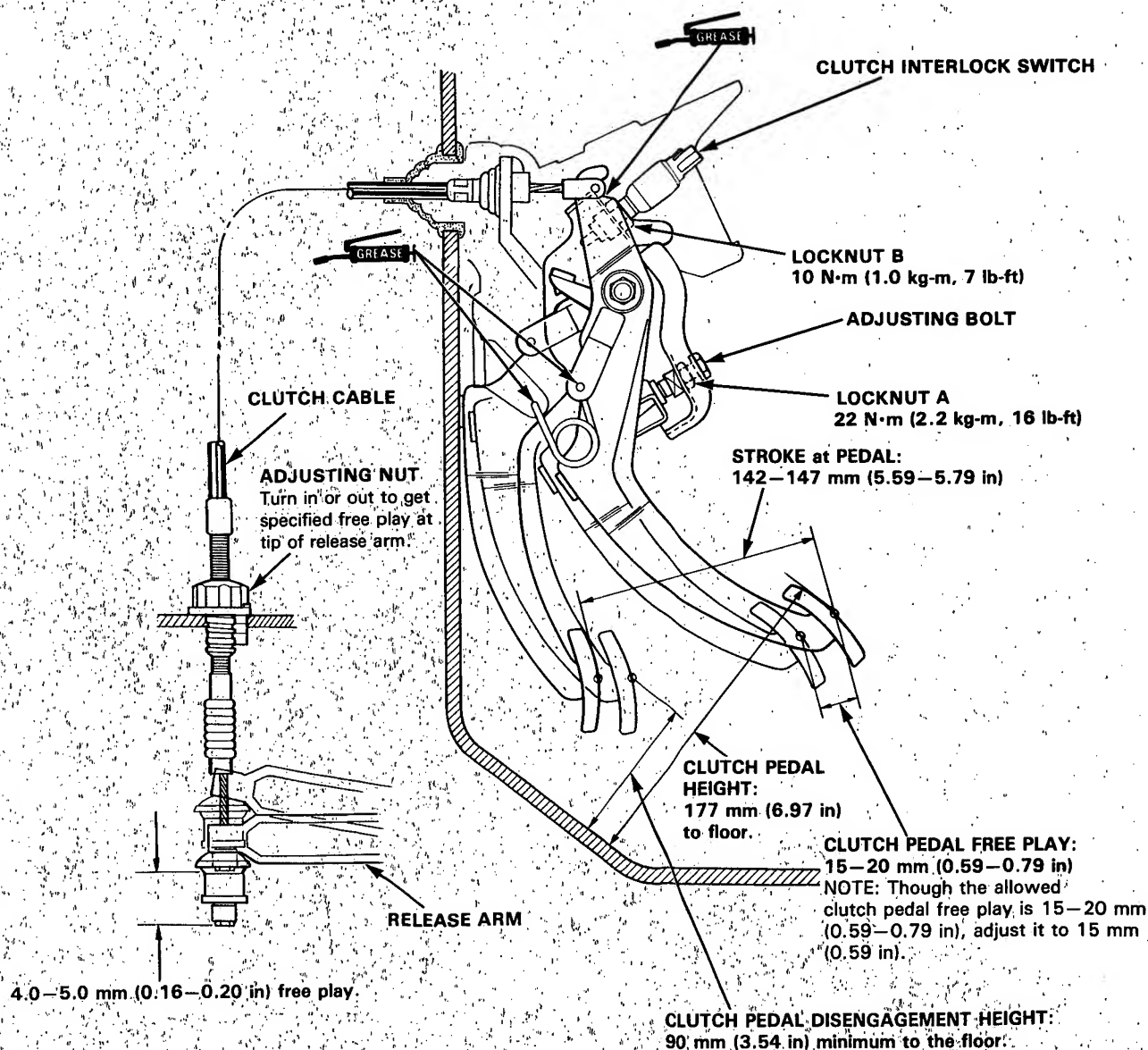
# Clutch Pedal

## Adjustment (without Cruise Control System)

NOTE: To check the switch, see section 23.

1. Measure the clutch pedal disengagement height.
2. Measure the clutch pedal free play.
3. Adjust the clutch pedal free play by turning the adjusting nut.
4. Make sure that there is 4.0–5.0 mm (0.16–0.20 in) free play at the tip of release arm after the adjustment.
5. Turn the adjusting bolt right or left to bring the clutch pedal stroke to the proper specification and tighten locknut A.

6. Loosen locknut B and clutch interlock switch.
7. Measure the clearance between the floor board and clutch pedal with the clutch pedal fully depressed.
8. Release the clutch pedal 15–20 mm (0.59–0.79 in) from the fully depressed position and hold it there. Adjust the position of the clutch interlock switch so that the engine will start with the clutch pedal in this position.
9. Thread the clutch interlock switch in 1/4–1/2 turn further.
10. Tighten locknut B.



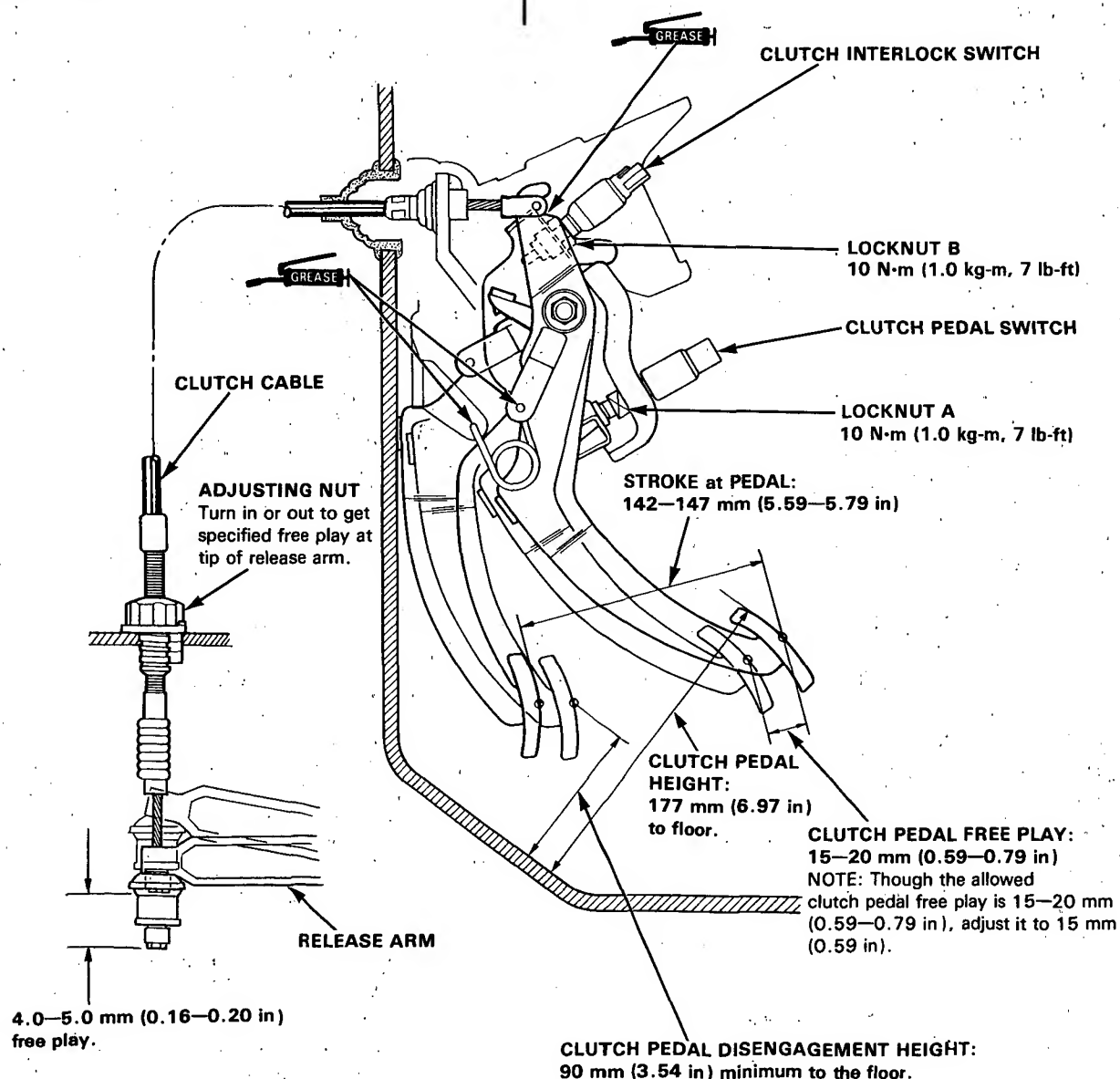


## Adjustment (with Cruise Control System)

NOTE: To check the switch, see section 23.

1. Measure the clutch pedal disengagement height.
2. Measure the clutch pedal free play.
3. Adjust the clutch pedal free play by turning the adjusting nut.
4. Make sure that there is 4.0–5.0 mm (0.16–0.20 in) free play at the tip of release arm after the adjustment.
5. Turn the clutch pedal switch right or left to bring the clutch pedal stroke to the proper specification and tighten locknut A.

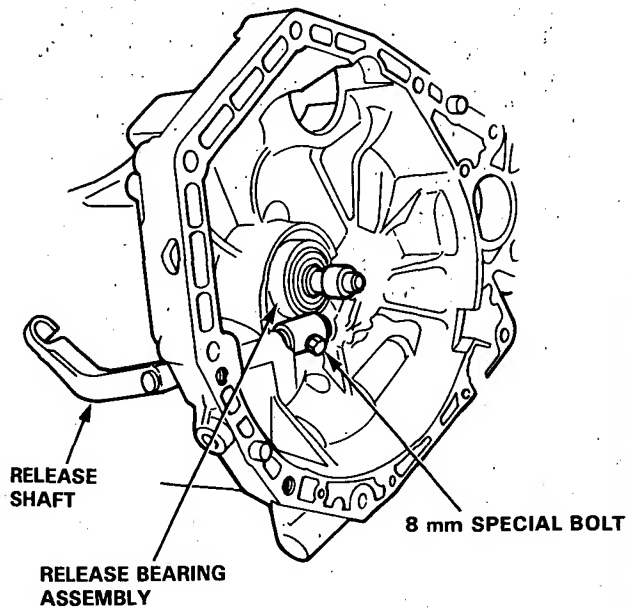
6. Loosen locknut B and clutch interlock switch.
7. Measure the clearance between the floor board and clutch pedal with the clutch pedal fully depressed.
8. Release the clutch pedal 15–20 mm (0.59–0.79 in) from the fully depressed position and hold it there. Adjust the position of the clutch interlock switch so that the engine will start with the clutch pedal in this position.
9. Thread the clutch interlock switch in 1/4–1/2 turn further.
10. Tighten locknut B.



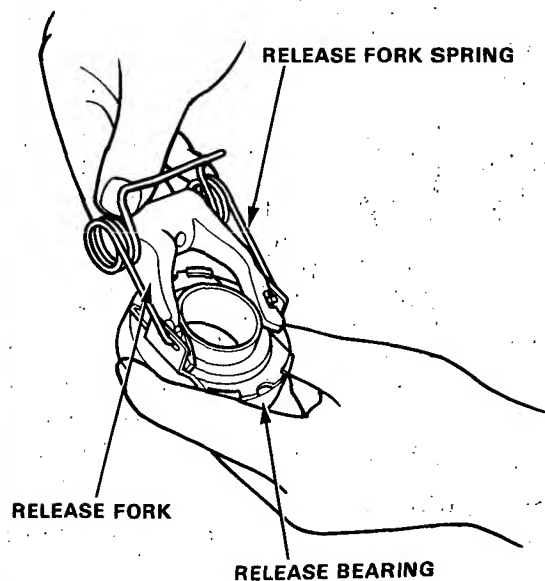
# Release Bearing

## Removal

1. Remove the transmission as described under "Transmission Removal".
2. Remove the 8 mm special bolt.
3. Remove the release shaft and release bearing assembly.



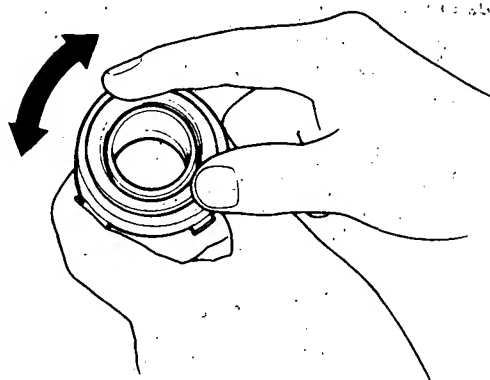
4. Separate the release fork from the release bearing by removing the release fork spring from the holes in the release bearing.



## Inspection

1. Check the release bearing for excessive play by spinning it by hand.

**CAUTION:** The release bearing is packed with grease. Do not wash it in solvent.



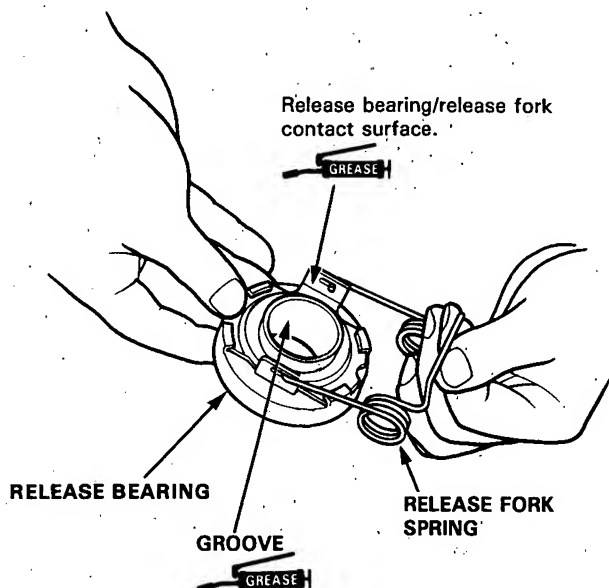
2. If there is excessive play, replace the release bearing with a new one.



## Installation

**NOTE:** Use only Super High Temp Urea Grease (P/N 08798-9002).

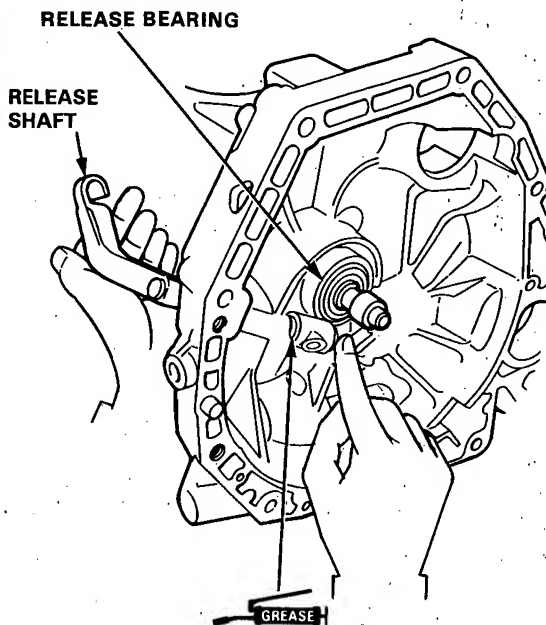
1. Apply grease to the groove inside the release bearing and to the release bearing/release fork contact surface.
2. Install the release fork spring in the location holes as shown.



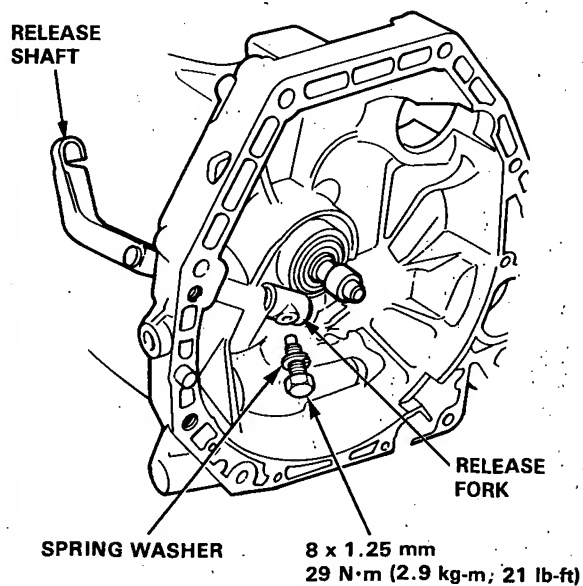
3. Align the release fork with the locating holes of the release bearing.



4. Install the release shaft and the release bearing.



5. Align the release shaft and release fork, then install the spring washer and bolt.



6. Move the release fork up and down to make sure the fork fits properly against the release bearing, and that the release bearing slides freely.

# Pressure Plate

## Removal/Inspection

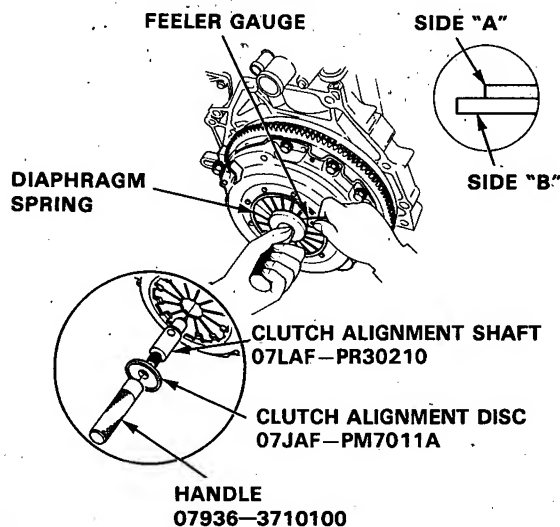
1. Inspect the fingers of the diaphragm spring for wear at the release bearing contact area.
2. Assemble the special tools as shown.

NOTE: Assemble the Clutch Alignment Disc with side "A" facing the diaphragm spring as shown.

3. Check the diaphragm spring fingers for height using the special tools and a feeler gauge as shown.

Standard: 0.6 mm (0.02 in)

Service Limit: 1.0 mm (0.04 in)



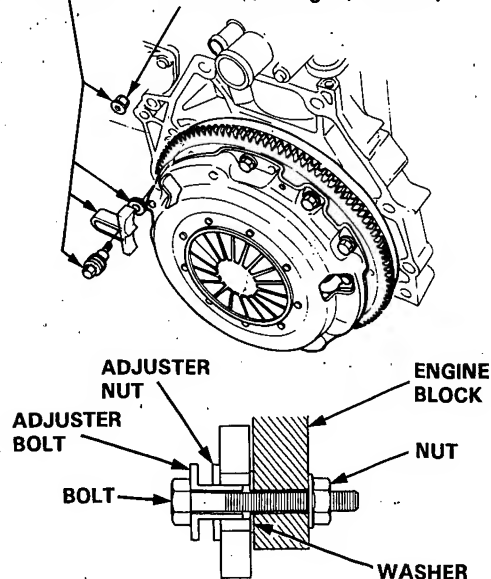
4. Install the special tools as shown.

RING GEAR HOLDER  
07LAB-PV00100

or

07924-PD20003

45 N·m (4.5 kg-m, 33 lb-ft)



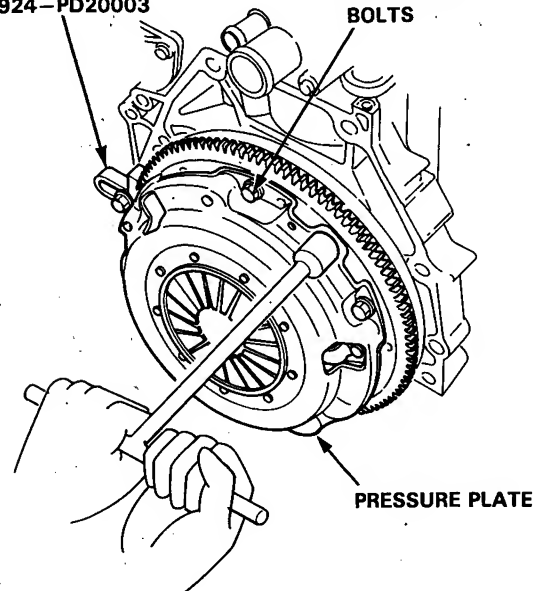
5. To prevent warping, loosen the pressure plate mounting bolts in a criss-cross pattern in several steps, then remove the pressure plate and clutch disc.

RING GEAR HOLDER  
07LAB-PV00100

or

07924-PD20003

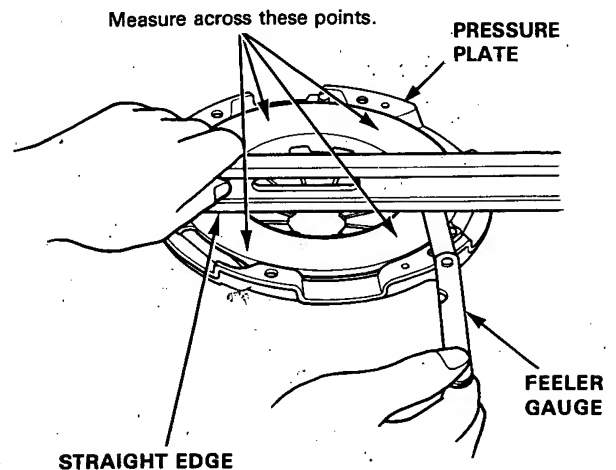
MOUNTING  
BOLTS



6. Inspect the pressure plate surface for wear, cracks, and burning.
7. Inspect for warpage using a straight edge and feeler gauge.

Standard: 0.03 mm (0.001 in)

Service Limit: 0.15 mm (0.006 in)





# Clutch Disc

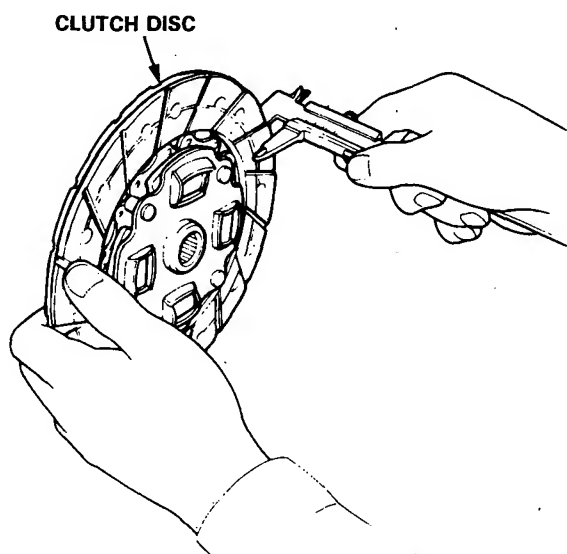
## Inspection

1. Inspection the lining of the clutch disc for signs of slipping or oil. Replace it if it is burned black or oil soaked.

2. Measure the clutch disc thickness.

**Standard (New):** 8.4–9.1 mm (0.33–0.36 in)

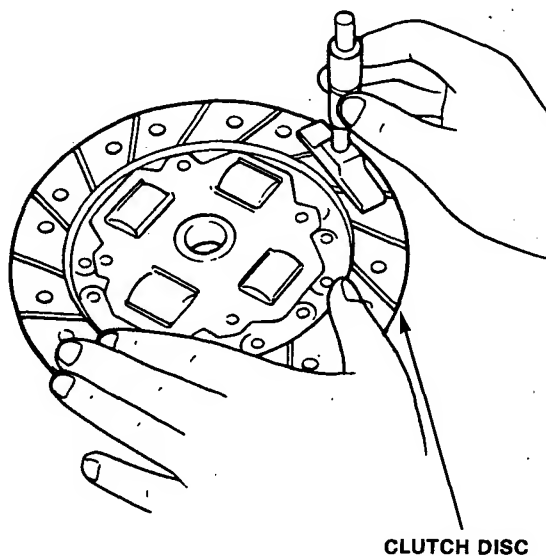
**Service Limit:** 6.0 mm (0.24 in)



3. Measure the depth from the lining surface to the rivets, on both sides.

**Standard (New):** 1.3 mm (0.05 in)

**Service Limit:** 0.2 mm (0.01 in)



# Flywheel, Flywheel Bearing

## Inspection

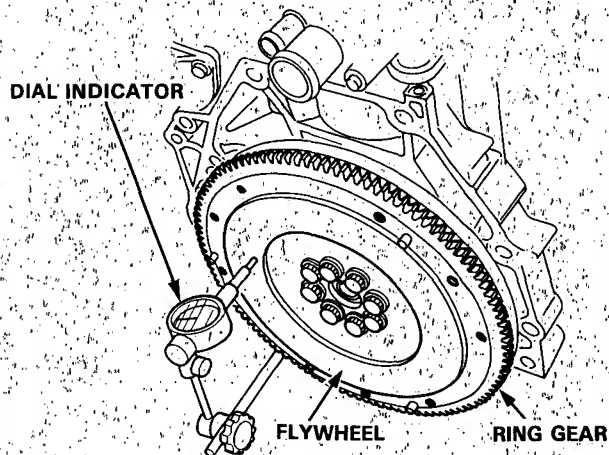
1. Inspect the ring gear of the flywheel teeth for wear and damage.
2. Inspect the clutch disc mating surface on the flywheel for wear, cracks, and burning.
3. Measure the flywheel runout using a dial indicator through at least two full turns. Push against the flywheel each time you turn it to take up the crankshaft thrust washer clearance.

NOTE: The runout can be measured with engine installed.

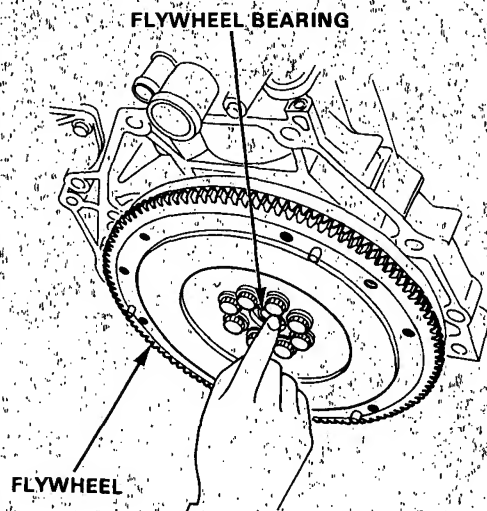
Standard (New): 0.05 mm (0.002 in)

Service Limit: 0.15 mm (0.006 in)

If the runout exceeds the service limit, replace it.



4. Turn the inner race of the flywheel bearing with your finger. The flywheel bearing should turn smoothly and quietly. Check that the bearing outer race fits tightly in the flywheel. Replace the flywheel bearing if the bearing outer race does not turn smoothly, quietly, or fit tight in the flywheel.

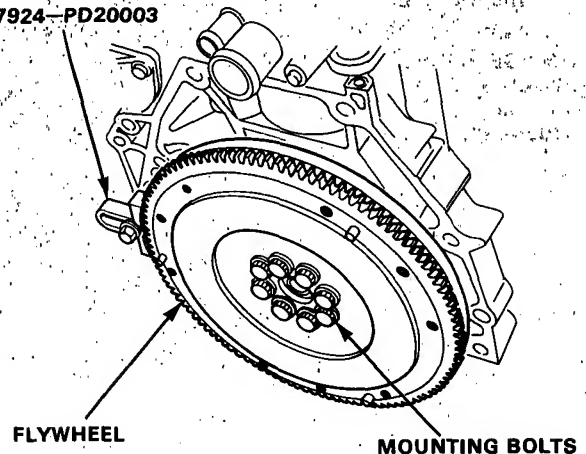


## Replacement

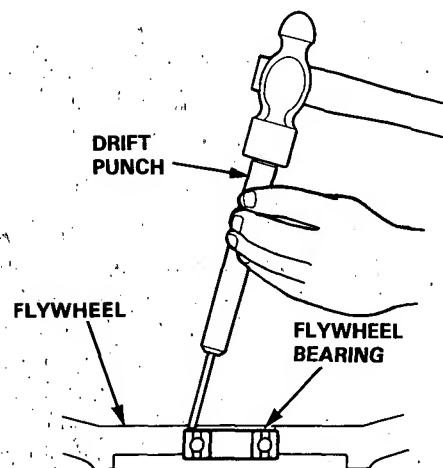
1. Remove the eight flywheel mounting bolts in a criss-cross pattern in several steps, and remove the flywheel.

RING GEAR HOLDER  
07LAB-PV00100

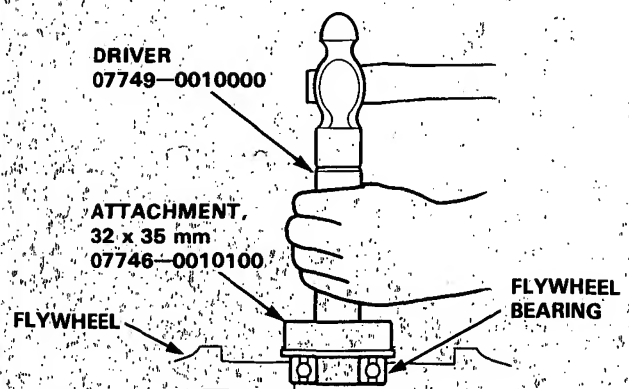
or  
07924-PD20003



2. Remove the flywheel bearing from the flywheel.



3. Drive the new flywheel bearing into the flywheel using the special tools as shown.





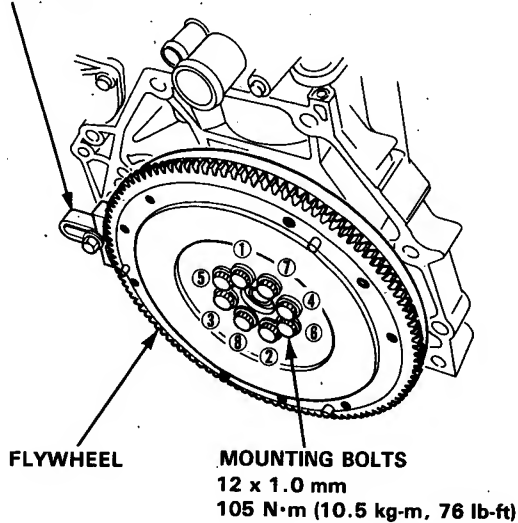
# Clutch Assembly



## Installation

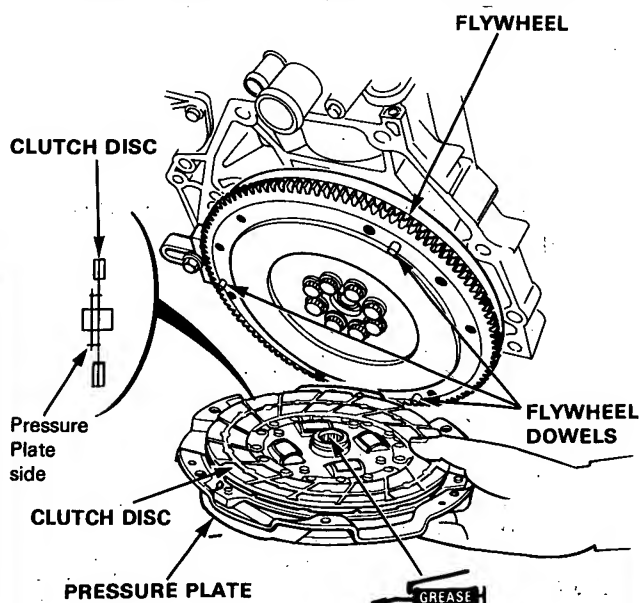
1. Align the hole in the flywheel with the crankshaft dowel pin, then install the flywheel. Install the bolts only finger tight.
2. Install the special tool, then torque the flywheel mounting bolts in a criss-cross pattern in several steps as shown.

RING GEAR HOLDER  
07LAB—PV00100  
or  
07924—PD20003



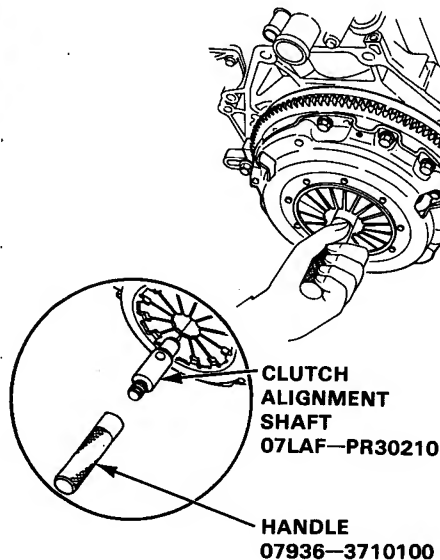
3. Install the clutch disc and pressure plate by aligning the flywheel dowels with dowel holes in the pressure plate.

NOTE: Use only Super High Temp Urea Grease (P/N 08798—9002) to the splines of the clutch disc.



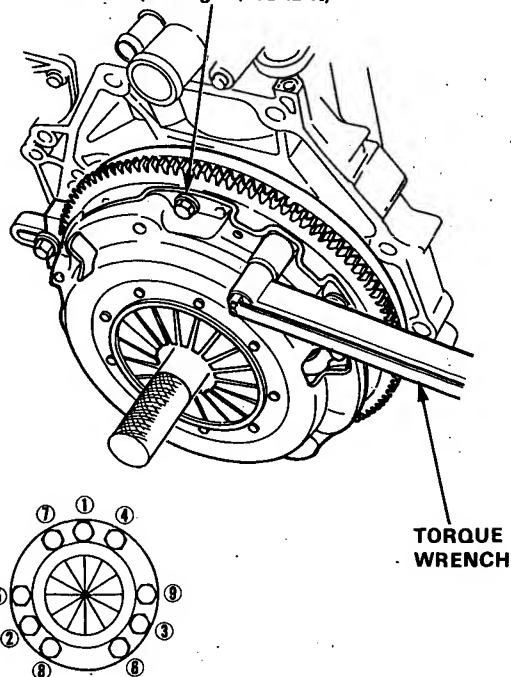
4. Install the pressure plate mounting bolts finger tight.

5. Install the special tools into the splined hole in the clutch disc as shown.



6. Torque the mounting bolts in a criss-cross pattern as shown. Tighten them several steps to prevent warping the diaphragm spring.

MOUNTING BOLTS  
8 x 1.25 mm  
26 N·m (2.6 kg-m, 19 lb-ft)



7. Remove the special tools.



## Manual Transmission

<b>Special Tools</b> .....	13-2	<b>Shift Fork Assembly</b>	
<b>Maintenance</b>		<b>Disassembly/Reassembly</b> .....	13-20
<b>Transmission Oil</b> .....	13-3	<b>Mainshaft Assembly</b>	
<b>Back-up Light Switch</b>		<b>Index</b> .....	13-21
<b>Replacement</b> .....	13-3	<b>Clearance Inspection</b> .....	13-22
<b>Transmission Assembly</b>		<b>Disassembly</b> .....	13-23
<b>Removal</b> .....	13-4	<b>Inspection</b> .....	13-24
<b>Gearshift Mechanism</b>		<b>Reassembly</b> .....	13-25
<b>Overhaul</b> .....	13-7	<b>Countershaft Assembly</b>	
<b>Illustrated Index</b> .....	13-8	<b>Index</b> .....	13-26
<b>Transmission Housing</b>		<b>Clearance Inspection</b> .....	13-27
<b>Removal</b> .....	13-10	<b>Disassembly</b> .....	13-28
<b>Reverse Shift Fork, Reverse Idler Gear</b>		<b>Inspection</b> .....	13-29
<b>Clearance Inspection</b> .....	13-11	<b>Reassembly</b> .....	13-30
<b>Removal</b> .....	13-12	<b>Synchro Ring, Gear</b>	
<b>Change Holder</b>		<b>Inspection</b> .....	13-32
<b>Clearance Inspection</b> .....	13-13	<b>Synchro Sleeve, Synchro Hub</b>	
<b>Removal</b> .....	13-15	<b>Inspection</b> .....	13-33
<b>Disassembly/Reassembly</b> .....	13-16	<b>Installation</b> .....	13-33
<b>Mainshaft, Countershaft, Differential Assemblies</b>		<b>Clutch Housing Bearing</b>	
<b>Removal</b> .....	13-17	<b>Replacement</b> .....	13-34
<b>Shift Rod</b>		<b>Mainshaft Thrust Shim</b>	
<b>Removal</b> .....	13-18	<b>Adjustment</b> .....	13-36
<b>Shift Fork, Shift Piece</b>		<b>Transmission</b>	
<b>Clearance Inspection</b> .....	13-18	<b>Reassembly</b> .....	13-39
		<b>Transmission Assembly</b>	
		<b>Installation</b> .....	13-44



**NOTE:** The radio may have a coded theft protection circuit. Be sure to get the customer's code number before

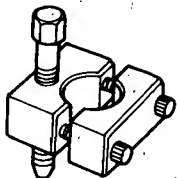
- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse.
- Removing the radio.

After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

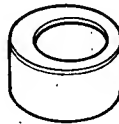
# Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAJ-PG20110	Mainshaft Holder	1	13-38
②	07GAJ-PG20130	Mainshaft Base	1	13-37, 38
* ③	07736-A01000A	Adjustable Bearing Puller, 25-40 mm	1	13-34, 35
④	07746-0010300	Attachment, 42 x 47 mm	1	13-34
⑤	07746-0010400	Attachment, 52 x 55 mm	1	13-34, 35
⑥	07746-0030100	Driver 40 mm I.D.	1	13-25, 31
⑦	07746-0030300	Attachment, 30 mm	1	13-25, 31
⑧	07746-0030400	Attachment, 35 mm	1	13-25, 31
⑨	07746-0041100	Pilot, 28 mm	1	13-34
⑩	07749-0010000	Driver	1	13-34, 35

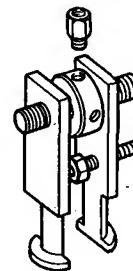
\* Must be used with commercially available 3/8 in x 16 thread/in Slide hammer.



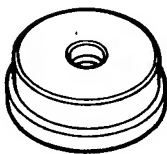
①



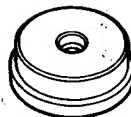
②



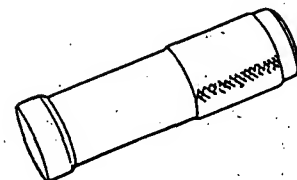
③



④



⑤



⑥



⑦



⑧



⑨



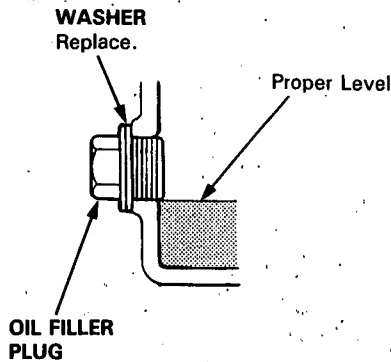
⑩

# Maintenance

## Transmission Oil

**NOTE:** Check the oil at operating temperature (the cooling fan comes on), with the engine OFF, and the car on level ground.

1. Remove the oil filler plug, then check the level and condition of the oil.



2. The oil level must be up to the filler hole. If it is below the hole, add oil until it runs out, then reinstall the oil filler plug.
3. If the transmission oil is dirty, remove the drain plug and drain the oil.
4. Reinstall the drain plug with a new washer, and refill the transmission oil to the proper level.

**NOTE:** The drain plug washer should be replaced at every oil change.

5. Reinstall the oil filler plug with a new washer.

### Oil Capacity

2.2 l (2.3 US qt, 1.9 Imp qt) at oil change.

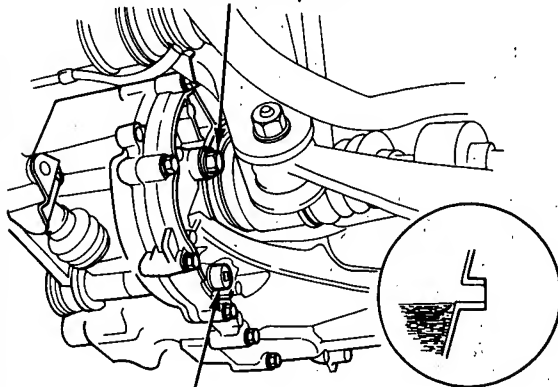
2.3 l (2.4 US qt, 2.0 Imp qt) at overhaul.

Use only SAE 10 W-30 or 10 W-40, SF or SG grade.

### OIL FILLER PLUG

45 N·m (4.5 kg-m, 33 lb-ft)

WASHER Replace.

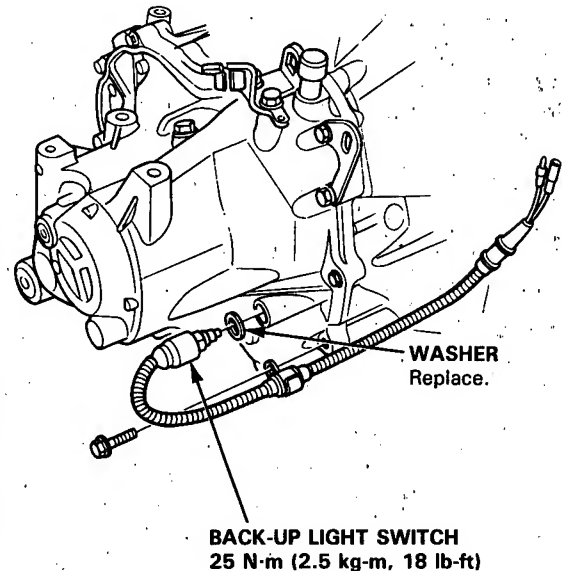


# Back-up Light Switch

## Replacement

**NOTE:** To check the switch, see section 23.

1. Disconnect the connector, then remove the switch connector from the connector clamp.
2. Remove the back-up light switch.
3. Install a new washer and back-up light switch.



# Transmission Assembly

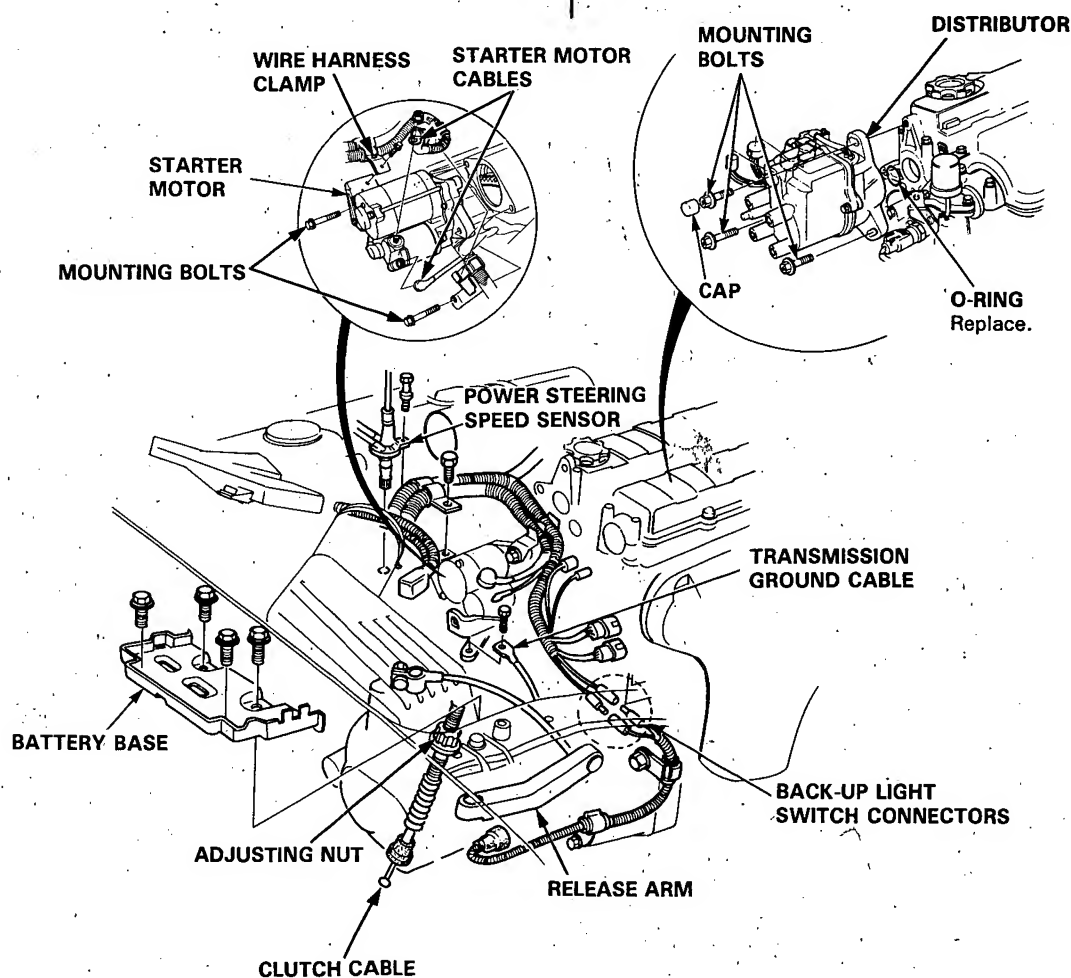
## Removal

### ⚠ WARNING

- Make sure jacks and safety stands are placed properly and hoist brackets are attached to correct positions on the engine (see section 1).
- Apply parking brake and block rear wheels so car will not roll off stands and fall on you while working under it.

**CAUTION:** Use fender covers to avoid damaging painted surfaces.

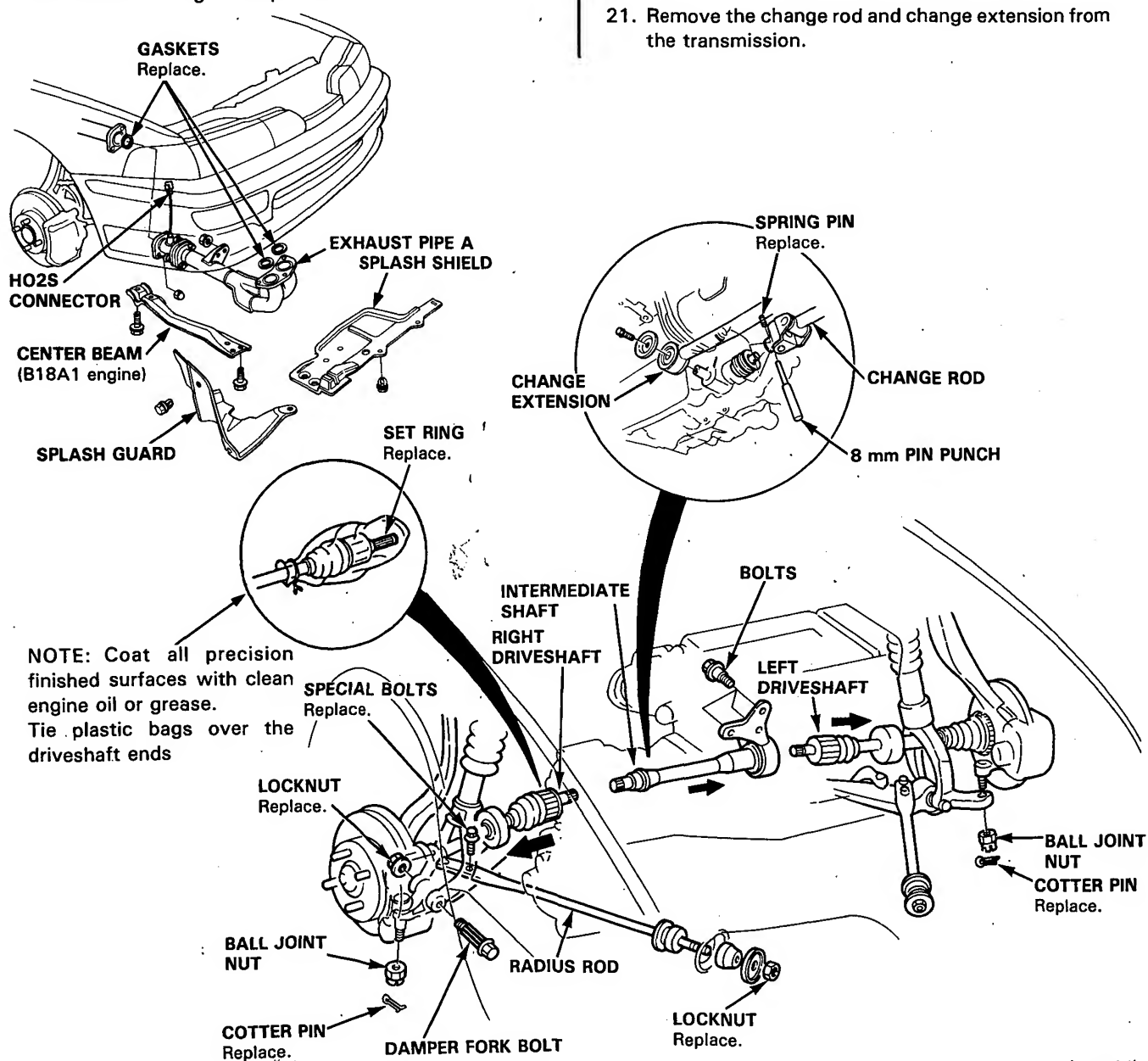
1. Disconnect the battery negative (–) cable and positive (+) cable, then remove the battery.
2. Remove the four mounting bolts; then remove the battery base.
3. Remove the air cleaner assembly with the intake air duct (see section 11).
4. Disconnect the transmission ground cable.
5. Loosen the clutch cable adjusting nut and disconnect the clutch cable at the release arm, then disconnect from the clutch cable bracket.
6. Disconnect the back-up light switch connectors.
7. Remove the power steering speed sensor, but leave its hoses connected.
8. Disconnect the starter motor cables and wire harness clamp from starter motor.
9. Disconnect the distributor connectors and remove the mounting bolts, then remove the distributor from the cylinder head.
10. Remove the mounting bolts, then remove the starter motor.





11. Drain the transmission oil (see page 13-3).
12. Remove the right front splash shield and splash guard.
13. Remove the center beam (B18A1 engine).
14. Disconnect the connector of the heated oxygen sensor (HO2S), then remove the exhaust pipe A.
15. Remove the cotter pin and ball joint nut, then separate the right ball joint and lower arm (see section 18).
16. Remove the right damper fork bolt.

17. Remove the locknut and the special bolts, then remove the right radius rod.
18. Remove the right driveshaft from the transmission (see section 16).
19. Remove the cotter pin and ball joint nut, then separate the left ball joint and lower arm. Remove the left driveshaft from the intermediate shaft (see section 16).
20. Remove the bolts, then remove the intermediate shaft (see section 16).
21. Remove the change rod and change extension from the transmission.

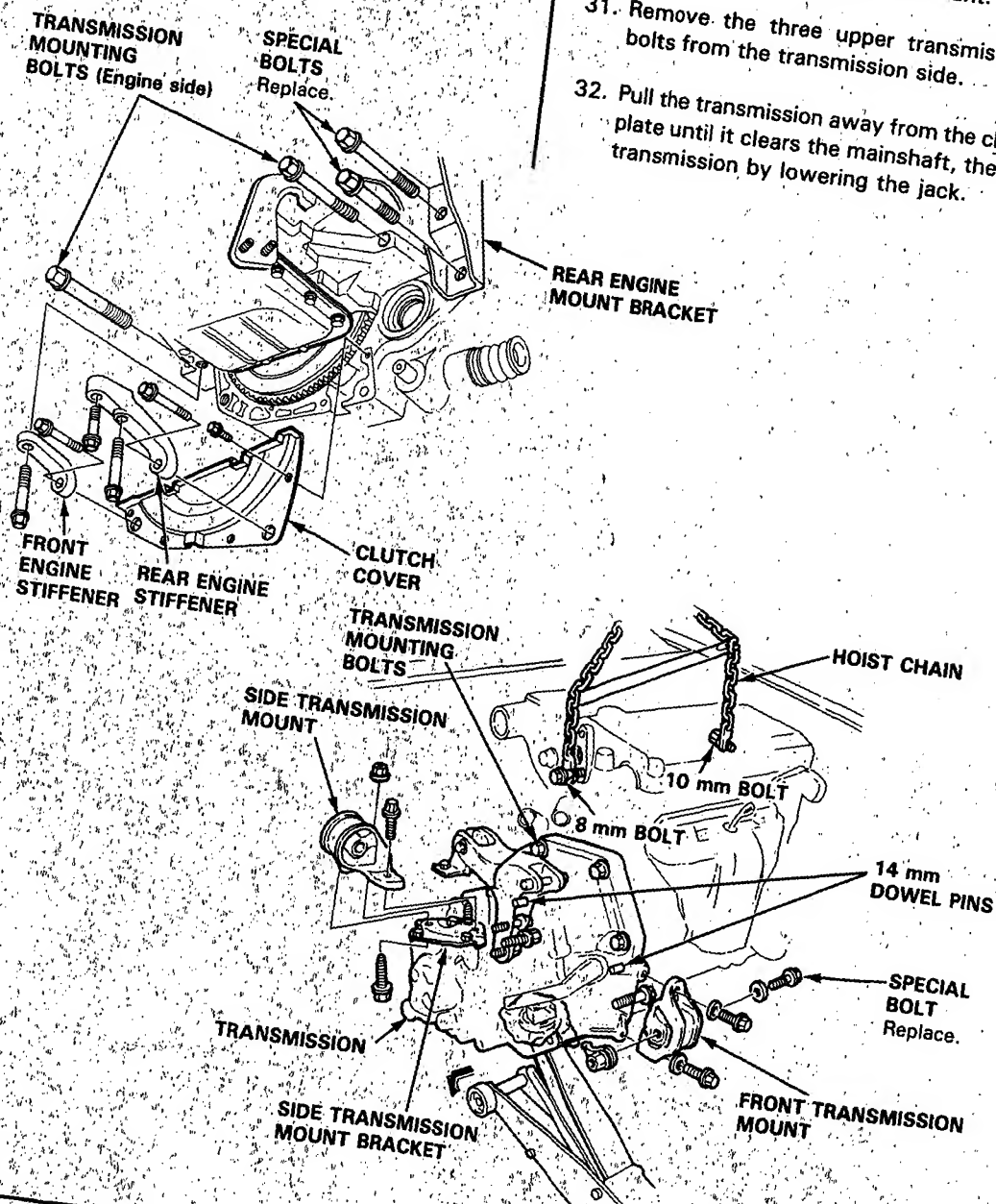


(cont'd)

# Transmission Assembly

## Removal (cont'd)

22. Remove the front engine stiffener and the rear engine stiffener.
23. Remove the four bolts, then remove the clutch cover.
24. Remove the two transmission mounting bolts (engine side).
25. Remove the two rear engine mount bracket special bolts.
26. Remove the side transmission mount bolt from the underside.
27. Remove the bolts, then remove the front transmission mount.
28. Install the bolts in the cylinder head and attach a hoist chain to the bolts, then lift the engine slightly to unload the mounts.
29. Place a jack under the transmission and raise the transmission just enough to take the weight off the mounts.
30. Remove the bolt and the nut that attach the bracket to the side transmission mount.
31. Remove the three upper transmission mounting bolts from the transmission side.
32. Pull the transmission away from the clutch pressure plate until it clears the mainshaft, then remove the transmission by lowering the jack.





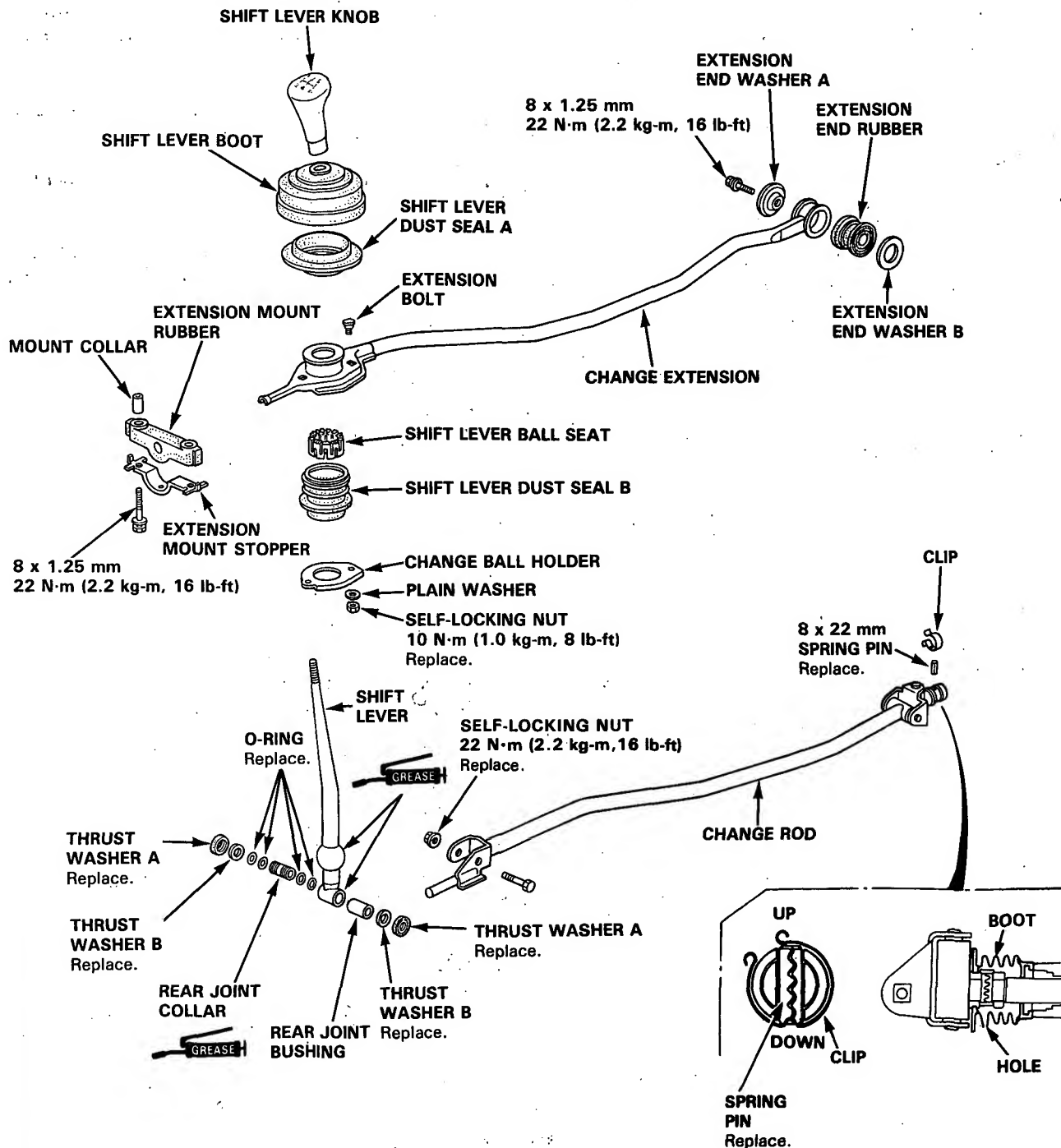
# Gearshift Mechanism



## Overhaul


### NOTE:

- Inspect rubber parts for wear and damage when disassembling.
- Install the clip on the change rod as shown.
- Turn the boot so the hole is facing down.
- Make sure the boot is installed on the change rod.



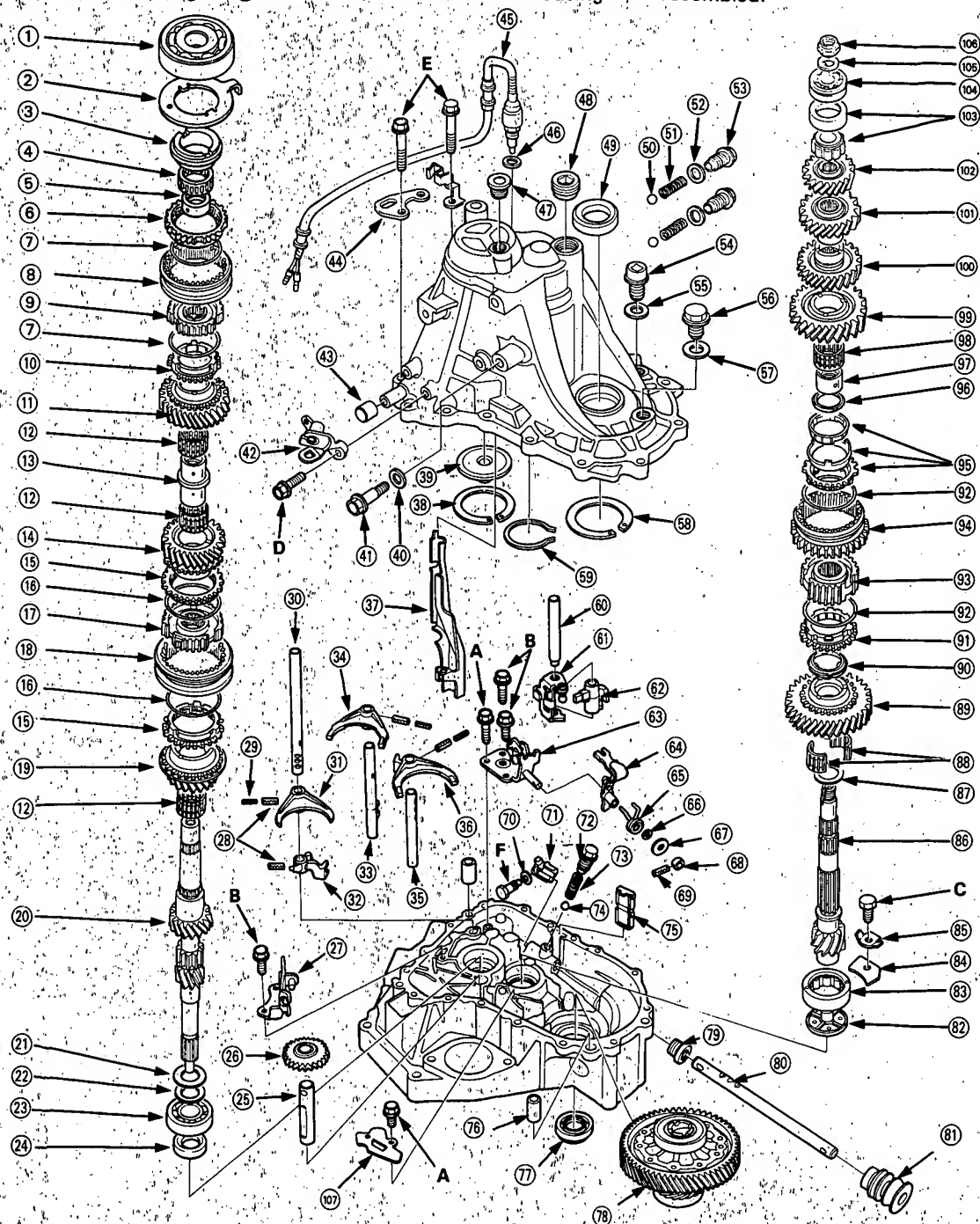
# Illustrated Index

Refer to the drawing below for the transmission disassembly/reassembly.  
Clean all parts thoroughly in solvent and dry with compressed air.

 Lubricate all parts with oil before reassembly.

## NOTE:

- This transmission uses no gaskets between the major housings; use liquid gasket (P/N 08718-0001) (see page 13-41).
- Always clean the magnet **75** whenever the transmission housing is disassembled.





NOTE: Always clean the magnet ⑦⑤ whenever the transmission housing is disassembled.

	Bolt Size	Torque Value
A	6 x 1.0 mm	12 N·m (1.2 kg-m, 9 lb-ft)
B	6 x 1.0 mm	15 N·m (1.5kg-m, 11lb-ft)
C	8 x 1.0 mm	15 N·m (1.5kg-m, 11lb-ft)
D	8 x 1.25mm	24 N·m (2.4kg-m, 17lb-ft)
E	8 x 1.25mm	28 N·m (2.8kg-m, 20lb-ft)
F	8 x 1.0 mm	32 N·m (3.2kg-m, 23lb-ft)

- ① BALL BEARING
- ② STOPPER RING
- ③ TAPER RING
- ④ NEEDLE BEARING
- ⑤ COLLAR
- ⑥ SYNCHRO RING
- ⑦ SYNCHRO SPRING
- ⑧ 5TH/REVERSE SYNCHRO SLEEVE
- ⑨ 5TH/REVERSE SYNCHRO HUB
- ⑩ SYNCHRO RING
- ⑪ 5TH GEAR
- ⑫ 38 x 43 x 26 mm NEEDLE BEARING
- ⑬ SPACER COLLAR
- ⑭ 4TH GEAR
- ⑮ SYNCHRO RING
- ⑯ SYNCHRO SPRING
- ⑰ 3RD/4TH SYNCHRO HUB
- ⑱ 3RD/4TH SYNCHRO SLEEVE
- ⑲ 3RD GEAR
- ⑳ MAINSHAFT
- ㉑ WASHER
- ㉒ SPRING WASHER
- ㉓ BALL BEARING  
Inspect for wear and operation.
- ㉔ 28 x 41 x 7 mm OIL SEAL Replace.
- ㉕ REVERSE IDLER GEAR SHAFT
- ㉖ REVERSE IDLER GEAR
- ㉗ REVERSE SHIFT FORK
- ㉘ 5 x 22 mm SPRING PIN Replace.
- ㉙ 3 x 22 mm SPRING PIN Replace.
- ㉚ 5TH/REVERSE SHIFT FORK SHAFT
- ㉛ 5TH/REVERSE SHIFT FORK
- ㉜ 5TH/REVERSE SHIFT PIECE
- ㉝ 3RD/4TH SHIFT FORK SHAFT
- ㉞ 3RD/4TH SHIFT FORK
- ㉟ 1ST/2ND SHIFT FORK SHAFT
- ㊱ 1ST/2ND SHIFT FORK
- ㊲ OIL GUTTER PLATE
- ㊳ 72 mm THRUST SHIM
- ㊴ OIL GUIDE PLATE
- ㊵ 10 mm WASHER Replace.

- ㊶ REVERSE IDLER GEAR SHAFT BOLT  
55 N·m (5.5 kg-m, 40 lb-ft)
- ㊷ TRANSMISSION HANGER B
- ㊸ BREATHER CAP
- ㊹ TRANSMISSION HANGER A
- ㊺ BACK-UP LIGHT SWITCH  
25 N·m (2.5 kg-m, 18 lb-ft)
- ㊻ 14mm WASHER Replace.
- ㊼ 16mm SEALING BOLT
- ㊽ 30 N·m (3.0 kg-m, 22 lb-ft)
- ㊾ 32mm SEALING BOLT  
25 N·m (2.5 kg-m, 18 lb-ft)
- ㊿ 40 x 62 x 9mm OIL SEAL Replace.
- ① STEEL BALL (D. 5/16 in)
- ② SPRING (L. 30 mm)
- ③ 12mm WASHER Replace.
- ④ SET BOLT  
22 N·m (2.2 kg-m, 16 lb-ft)
- ⑤ OIL FILLER PLUG  
45 N·m (4.5 kg-m, 33 lb-ft)
- ⑥ 20mm WASHER Replace.
- ⑦ OIL DRAIN PLUG  
40 N·m (4.0 kg-m, 28 lb-ft)
- ⑧ 14mm WASHER Replace.
- ⑨ 80mm THRUST SHIM
- ⑩ SNAP RING
- ⑪ SHIFT PIECE SHAFT
- ⑫ INTERLOCK
- ⑬ SHIFT PIECE
- ⑭ SHIFT ARM HOLDER
- ⑮ SELECT ARM
- ⑯ SELECT RETURN SPRING
- ⑰ 10mm THRUST SHIM
- ⑱ 10mm WASHER
- ⑲ LOCK COLLAR
- ⑳ 3 x 16mm SPRING PIN  
Replace.
- ㉑ 8mm SPRING WASHER
- ㉒ CHANGE PIECE
- ㉓ SEALING BOLT  
22 N·m (2.2 kg-m, 16 lb-ft)
- ㉔ SPRING (L. 23.5 mm)
- ㉕ STEEL BALL (D. 5/16 in)

- ㉖ MAGNET
- ㉗ 14 x 20mm DOWEL PIN
- ㉘ 35 x 56 x 8mm OIL SEAL  
Replace.
- ㉙ DIFFERENTIAL ASSEMBLY  
See section 15
- ㉚ 14 x 25 x 16mm OIL SEAL  
Replace.
- ㉛ SHIFT ROD
- ㉜ BOOT
- ㉝ OIL GUIDE PLATE
- ㉞ 33 x 60 x 20 mm  
NEEDLE BEARING  
Inspect for wear and operation.
- ㉟ BEARING RETAINER PLATE
- ① LOCK WASHER
- ② COUNTERSHAFT
- ③ 40 x 50 mm THRUST SHIM
- ④ 37 x 42 x 25 mm  
NEEDLE BEARING
- ⑤ 1ST GEAR
- ⑥ FRICTION DAMPER
- ⑦ SYNCHRO RING
- ⑧ SYNCHRO SPRING
- ⑨ 1ST/2ND SYNCHRO HUB
- ⑩ REVERSE GEAR
- ⑪ \*1: SYNCHRO RING
- ⑫ \*2: DOUBLE CONE SYNCHRO
- ⑬ FRICTION DAMPER
- ⑭ DISTANCE COLLAR
- ⑮ 42 x 47 x 23.5 mm  
NEEDLE BEARING
- ⑯ 2ND GEAR
- ⑰ 3RD GEAR
- ⑱ 4TH GEAR
- ㉑ 5TH GEAR
- ㉒ NEEDLE BEARING
- ㉓ BALL BEARING
- ㉔ SPRING WASHER
- ㉕ LOCKNUT Replace.  
110→0→110 N·m  
11.0→0→11.0 kg-m,  
80→0→80 lb-ft
- ㉖ OIL CHAMBER PLATE

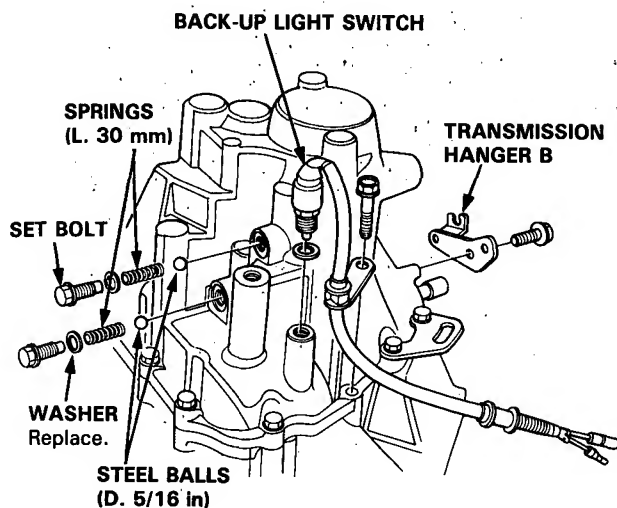
- \*1: B18A1 engine
- \*2: B17A1 engine

# Transmission Housing

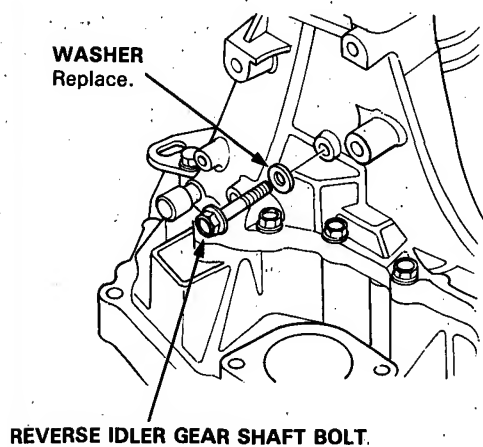
## Removal

**NOTE:** Place the clutch housing on two pieces of wood thick enough to keep the mainshaft from hitting the workbench.

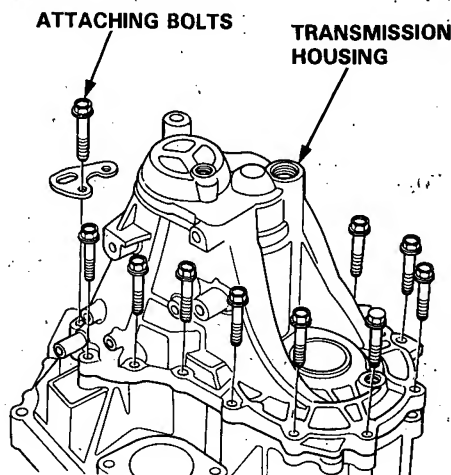
1. Remove the back-up light switch.
2. Remove the transmission hanger B.
3. Remove the set bolts, springs, and steel balls.



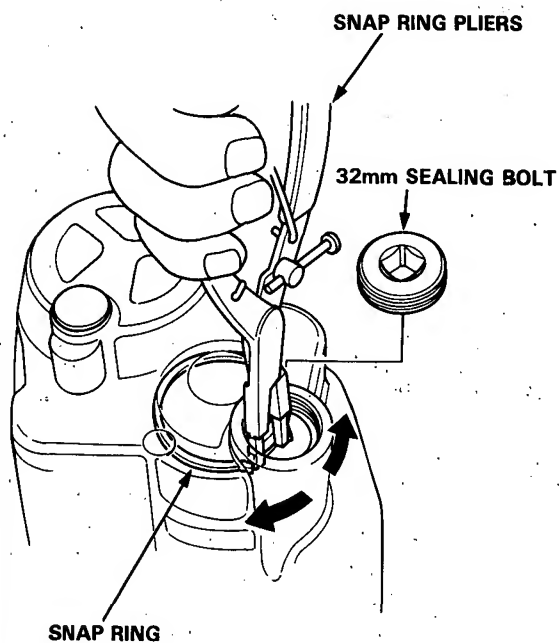
2. Remove the reverse idler gear shaft bolt.



3. Remove the transmission housing attaching bolts in a criss-cross pattern in several steps.



4. Remove the 32mm sealing bolt.
5. Expand the snap ring on the countershaft ball bearing and remove it from the groove using a pair of snap ring pliers.



## Reverse Shift Fork, Reverse Idler Gear



### Clearance Inspection

1. Measure the clearance between the reverse shift fork and 5th/reverse shift piece pin.

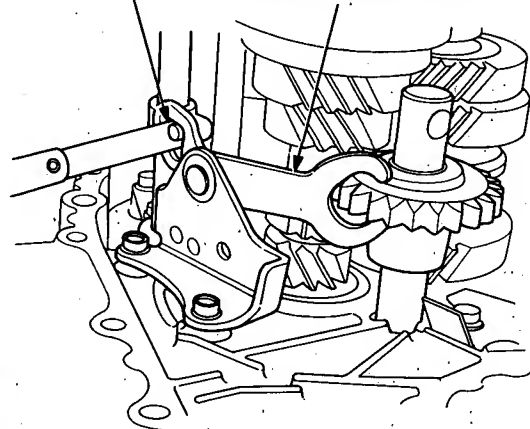
**Standard:**

**Reverse Side:** 0.05–0.45 mm (0.002–0.018 in)

**5th Side:** 0.40–0.90 mm (0.016–0.035 in)

5TH/REVERSE SHIFT PIECE PIN

REVERSE SHIFT FORK



2. If the clearance exceeds the standard, measure the width of the groove in the reverse shift fork.

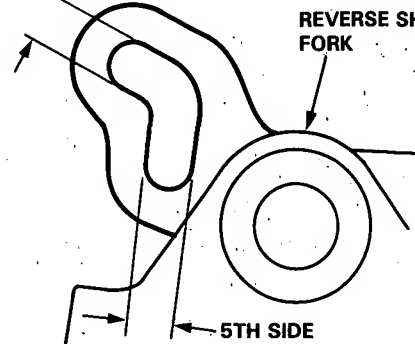
**Standard:**

**Reverse Side:** 7.05–7.25 mm (0.278–0.285 in)

**5th Side:** 7.40–7.70 mm (0.291–0.303 in)

REVERSE SIDE

REVERSE SHIFT FORK



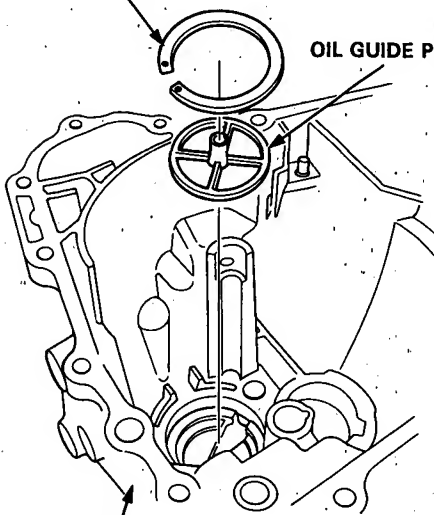
If the width of the groove exceeds the standard, replace the reverse shift fork with a new one.  
If the width of the groove is within the standard, replace the 5th/reverse shift piece with a new one.

(cont'd)

6. Separate the transmission housing from the clutch housing and wipe it clean of the sealant.
7. Remove the thrust shim and oil guide plate from the transmission housing.

THRUST SHIM

OIL GUIDE PLATE

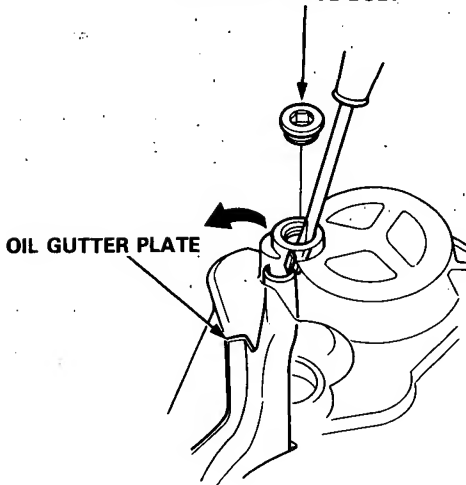


TRANSMISSION HOUSING

8. Remove the 16 mm sealing bolt, then remove the oil gutter plate.

16 mm SEALING BOLT

OIL GUTTER PLATE

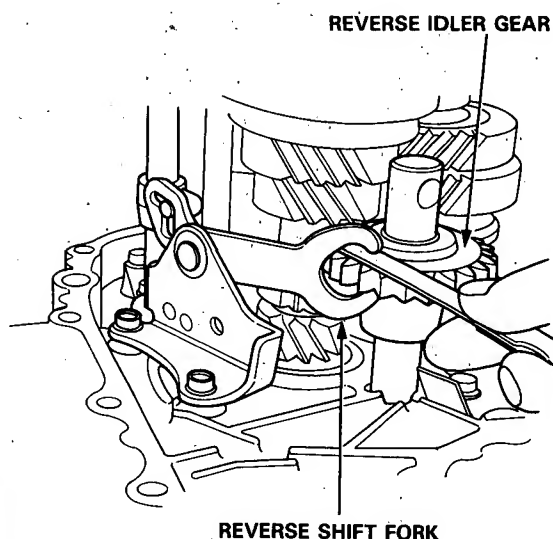


# Reverse Shift Fork, Reverse Idler Gear

## Clearance Inspection (cont'd)

3. Measure the clearance between the reverse idler gear and reverse shift fork.

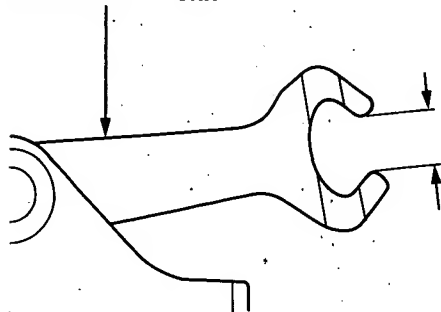
**Standard:** 0.5—1.1 mm (0.020—0.043 in)  
**Service Limit:** 1.8 mm (0.071 in)



4. If the clearance exceeds the service limit, measure the width of the reverse shift fork.

**Standard:** 13.0—13.3 mm (0.512—0.524 in)

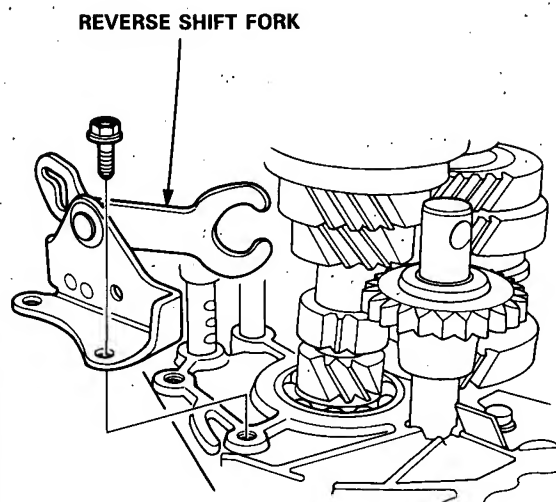
REVERSE SHIFT FORK



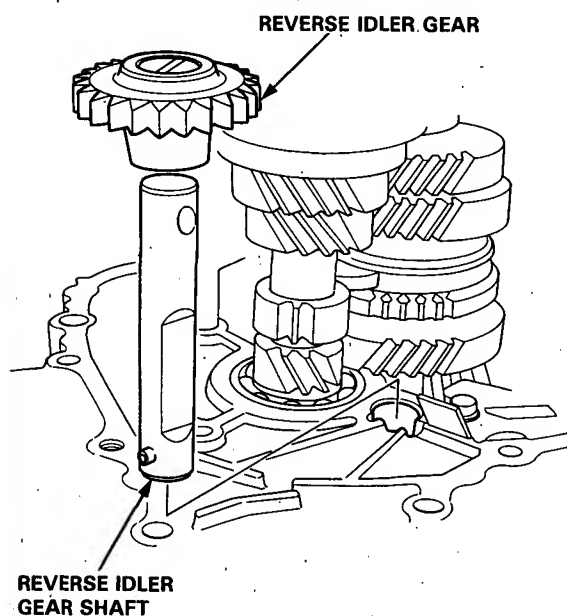
If the width exceeds the standard, replace the reverse shift fork with a new one.  
If the width is within the standard, replace the reverse idler gear with a new one.

## Removal

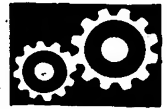
1. Remove the reverse shift fork.



2. Shift the 3rd/4th shift fork to the 4th side, then remove the reverse idler gear and reverse idler gear shaft.



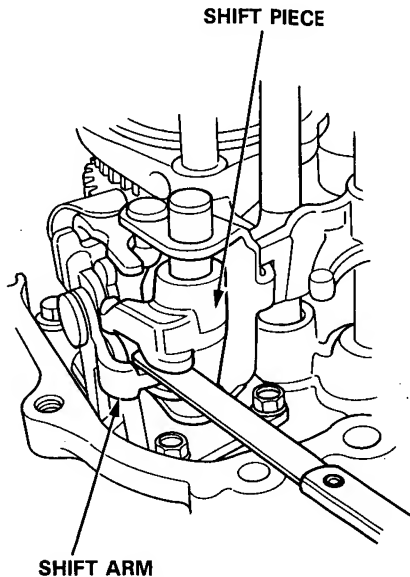
# Change Holder



## Clearance Inspection

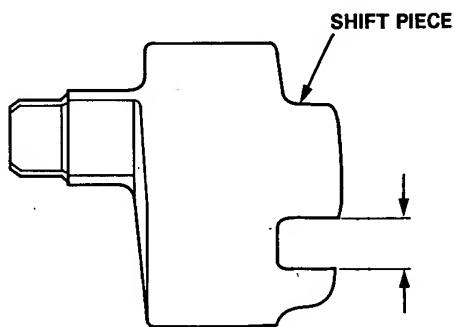
1. Measure the clearance between the shift piece and shift arm

**Standard:** 0.1–0.3 mm (0.004–0.012 in)  
**Service Limit:** 0.6 mm (0.024 in)



2. If the clearance exceeds the service limit, measure the width of the groove in the shift piece.

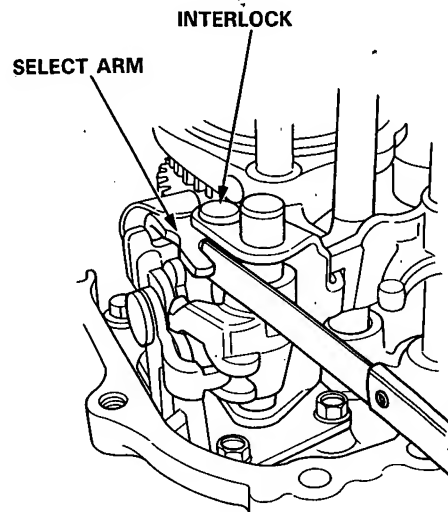
**Standard:** 8.1–8.2 mm (0.319–0.329 in)



If the width of the groove exceeds the standard, replace the shift piece.  
If the width of the groove is within the standard, replace the shift arm.

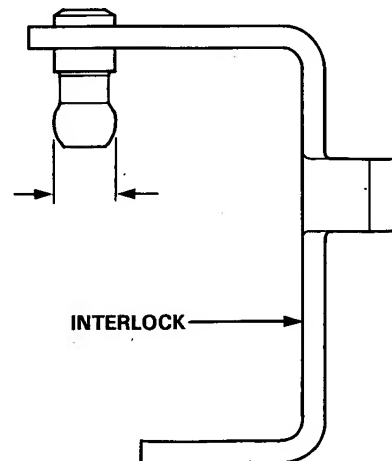
3. Measure the clearance between the select arm and interlock.

**Standard:** 0.05–0.25 mm (0.002–0.010 in)  
**Service Limit:** 0.5 mm (0.020 in)



4. If the clearance exceeds the service limit, measure the width of the interlock.

**Standard:** 9.9–10.0 mm (0.390–0.394 in)



If the width is less than the standard, replace the interlock.  
If the width is within the standard, replace the select arm.

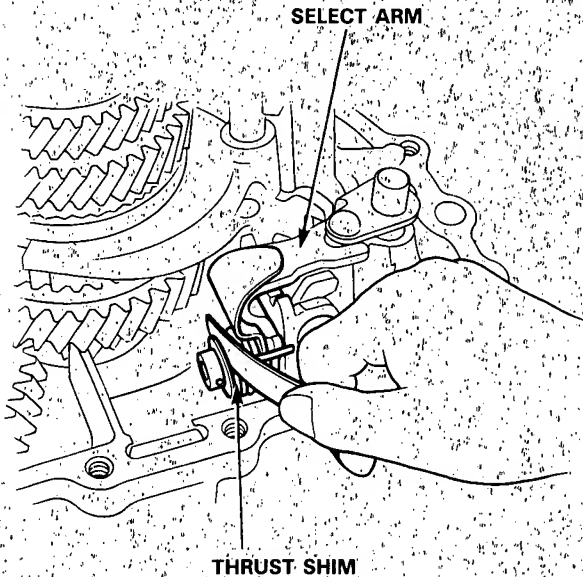
(cont'd)

# Change Holder

## Clearance Inspection (cont'd)

7. Measure the clearance between the select arm and thrust shim.

Standard: 0.01–0.20 mm (0.0004–0.0080 in)



8. If the clearance exceeds the standard, select the appropriate thrust shim for the correct clearance from the chart below:

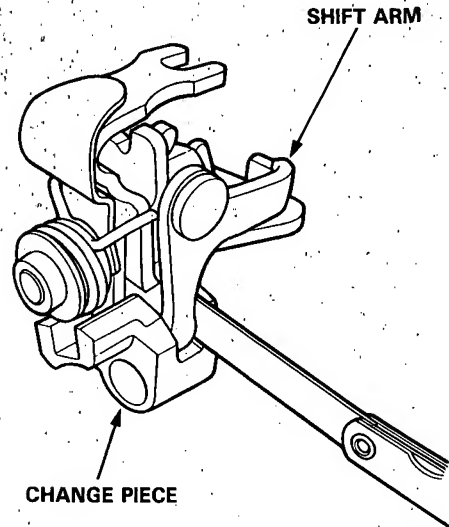
THRUST SHIM

	Part Number	Thickness
A	24435–689–000	0.8 mm (0.031 in)
B	24436–689–000	1.0 mm (0.039 in)
C	24437–689–000	1.2 mm (0.047 in)
D	24438–689–000	1.4 mm (0.055 in)
E	24439–689–000	1.6 mm (0.063 in)

9. Measure the clearance between the shift arm and change piece.

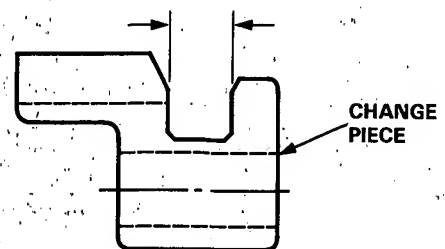
Standard: 0.05–0.35 mm (0.002–0.014 in)

Service Limit: 0.8 mm (0.031 in)



10. If the clearance exceeds the service limit, measure the groove of the change piece.

Standard: 11.8–12.0 mm (0.465–0.472 in)



If the groove exceeds the standard, replace the change piece.

If the groove is within the standard, replace the shift arm.

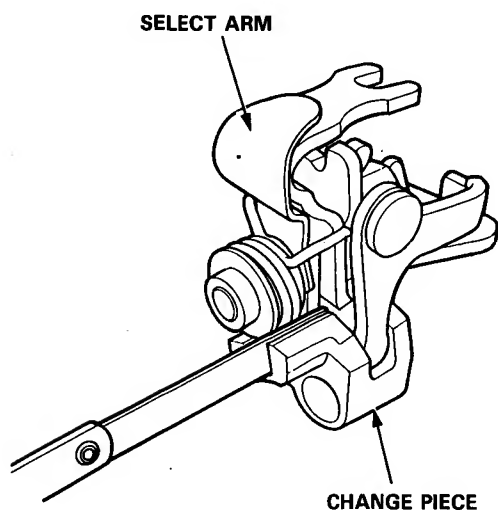




11. Measure the clearance between the select arm and change piece.

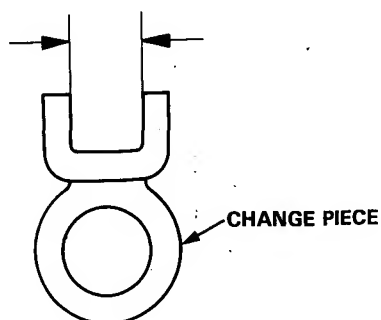
**Standard:** 0.05–0.25 mm (0.002–0.01 in)

**Service Limit:** 0.5 mm (0.020 in)



12. If the clearance exceeds the service limit, measure the width of the groove in the change piece.

**Standard:** 12.05–12.15 mm (0.474–0.478 in)

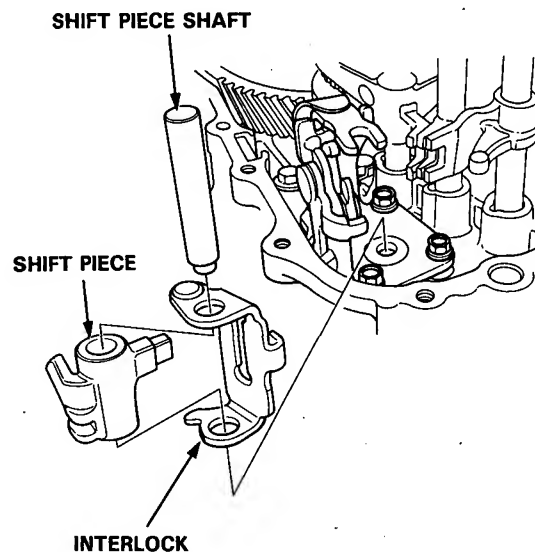


If the width exceeds the standard, replace the change piece.

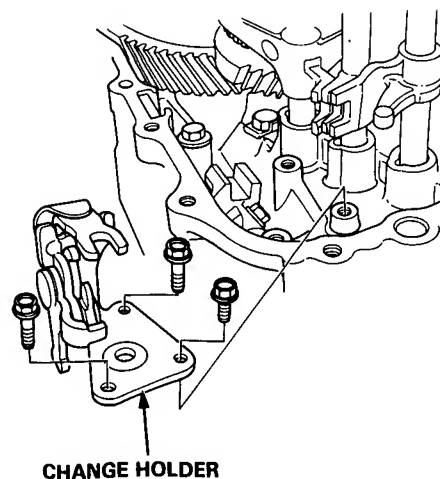
If the width is within the standard, replace the select arm.

## Removal

1. Remove the shift piece shaft, then remove the shift piece and interlock.



2. Remove the change holder.

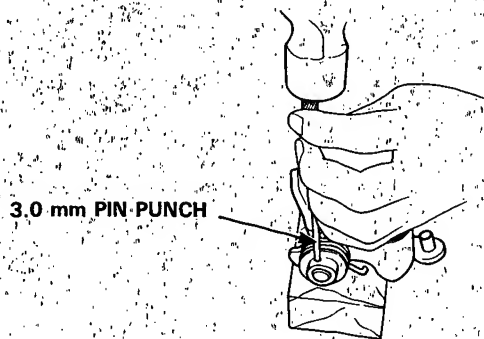
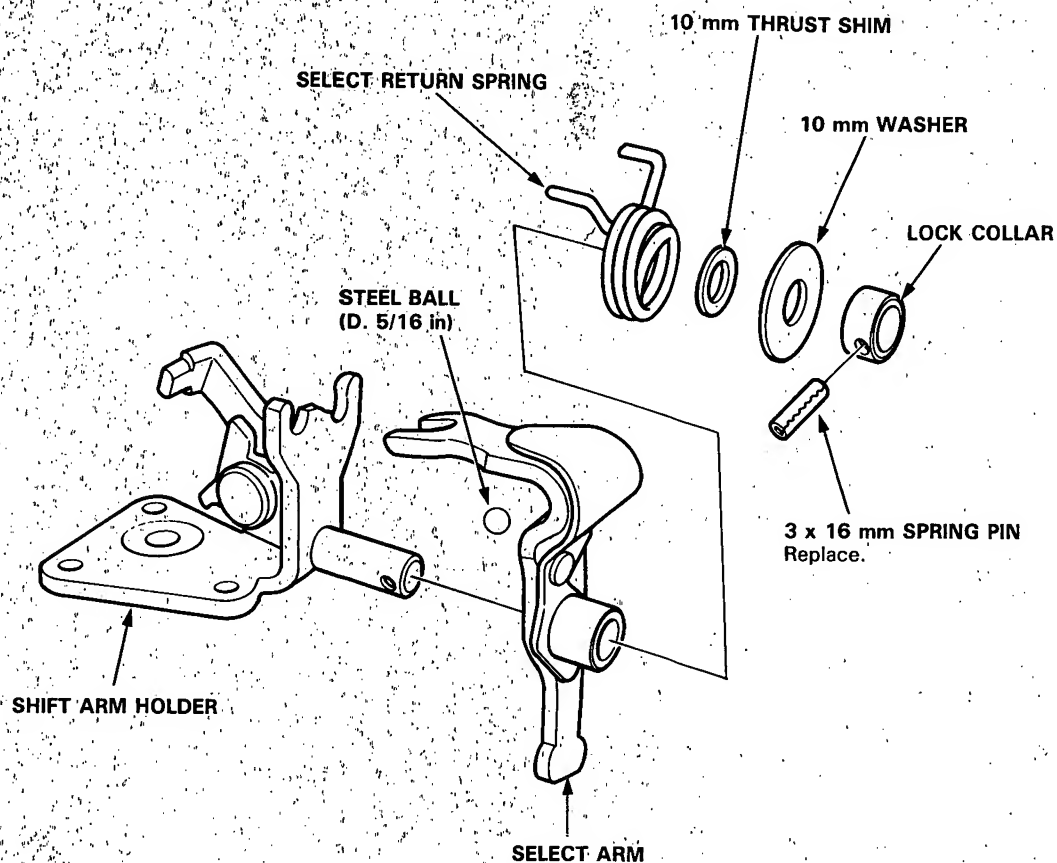


# Change Holder

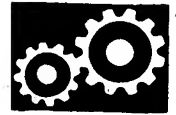
## Disassembly/Reassembly



Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact surfaces.



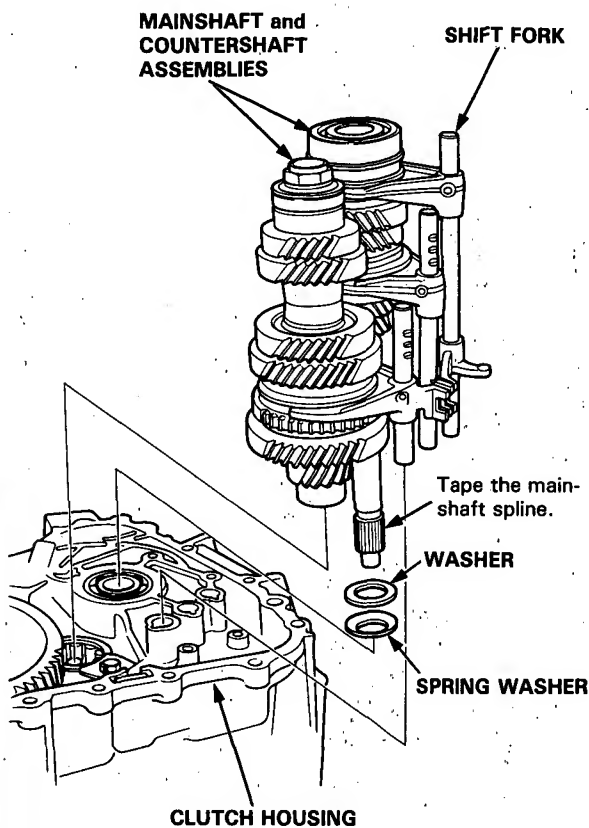
# Mainshaft, Countershaft, Differential Assemblies



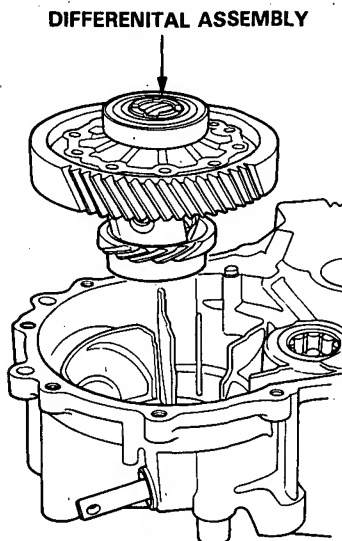
## Removal

1. Remove the mainshaft and countershaft assemblies with the shift fork from the clutch housing.

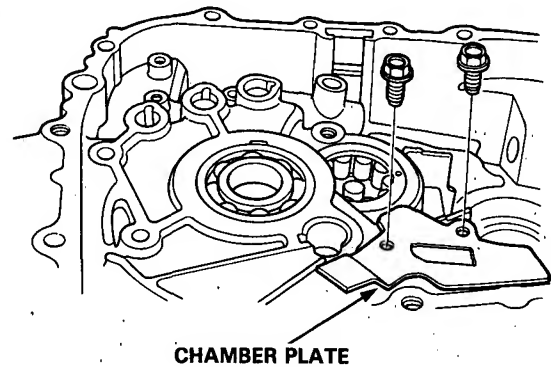
**NOTE:** Before removing the mainshaft and countershaft assemblies, tape the mainshaft spline to protect it.



2. Remove the differential assembly.



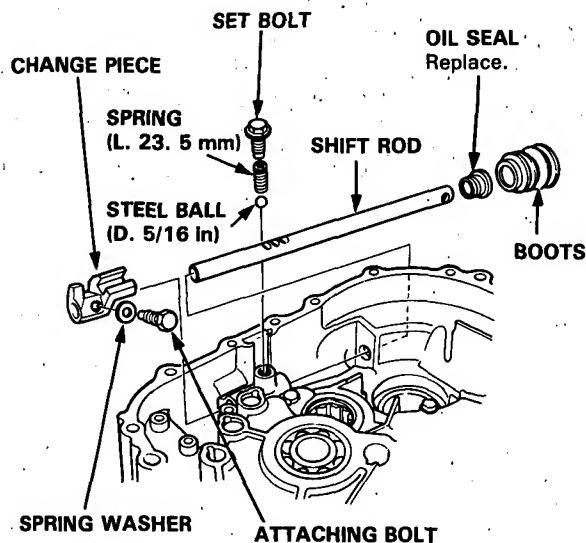
3. Remove the chamber plate.



## Shift Rod

### Removal

1. Remove the change piece attaching bolt and spring washer.
2. Remove the set bolt, then remove the spring and steel ball.
3. Remove the shift rod, then remove the change piece.



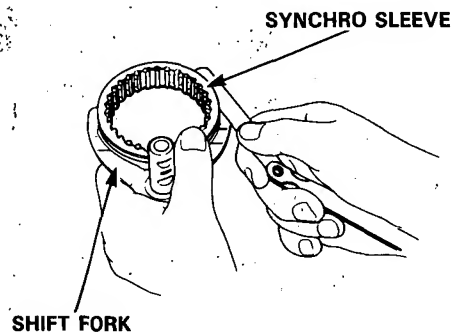
## Shift Fork, shift piece

### Clearance Inspection

NOTE: The synchro sleeve and suynchro hub should be replaced as a set.

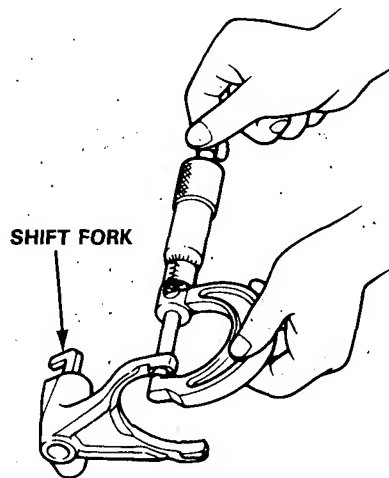
1. Measure the clearance between the each shift fork and its matching synchro sleeve.

Standard: 0.45–0.65 mm (0.018–0.026 in)  
Service Limit: 1.0 mm (0.039 in)



2. If the clearance exceeds the service limit, measure the thickness of the shift fork fingers.

Standard: 7.4–7.5 mm (0.291–0.295 in)



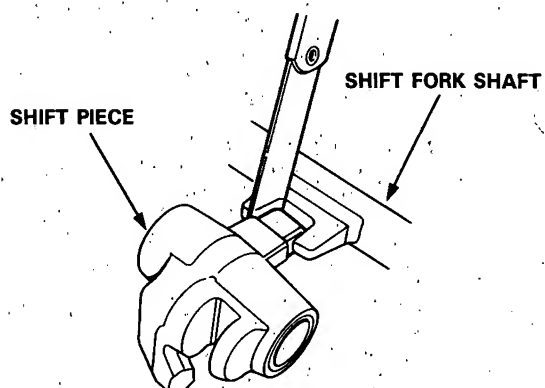
If the thickness of the shift fork fingers is less than the standard, replace the shift fork with a new one. If the thickness of the shift fork fingers is within the standard, replace the synchro sleeve with a new one.



3. Measure the clearance between the shift piece and shift fork shafts.

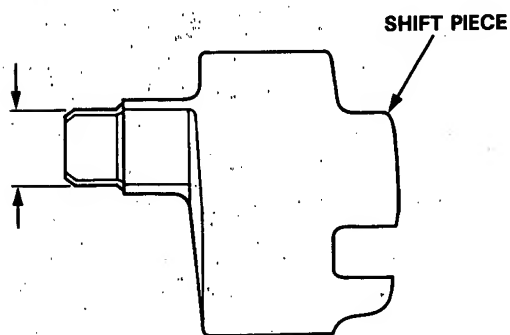
**Standard:** 0.2–0.5 mm (0.008–0.020 in)

**Service Limit:** 0.8 mm (0.031 in)



4. If the clearance exceeds the service limit, measure the width of the shift piece.

**Standard:** 11.9–12.0 mm (0.469–0.472 in)




If the width of the shift piece is less than the standard, replace the shift piece with a new one.  
If the width is within the standard, replace the shift fork shaft with a new one.

# Shift Fork Assembly

## Disassembly/Reassembly

**NOTE:** Install the 3 mm spring pins, so their grooves are 180° apart from the grooves in the 5 mm spring pins.

 Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact surfaces.

**Disassembly:** Remove with the 3 mm spring pin and 5 mm spring pin.

**Reassembly:** Install the 5 mm spring pin first, then install the 3 mm spring pin.

5TH/REVERSE SHIFT FORK SHAFT

3RD/4TH SHIFT FORK

5 x 22 mm SPRING PIN  
Replace.

3 x 22 mm SPRING PIN  
Replace.

5TH/REVERSE SHIFT FORK

3 x 22 mm SPRING PIN  
Replace.

5 x 22 mm SPRING PIN  
Replace.

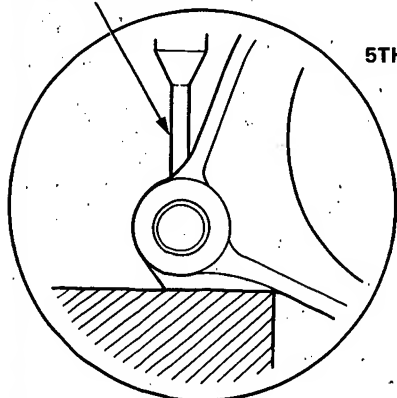
5.0 mm PIN PUNCH  
3.0 mm PIN PUNCH

3RD/4TH SHIFT FORK SHAFT

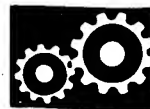
1ST/2ND SHIFT FORK

1ST/2ND SHIFT FORK SHAFT

5TH/REVERSE SHIFT PIECE




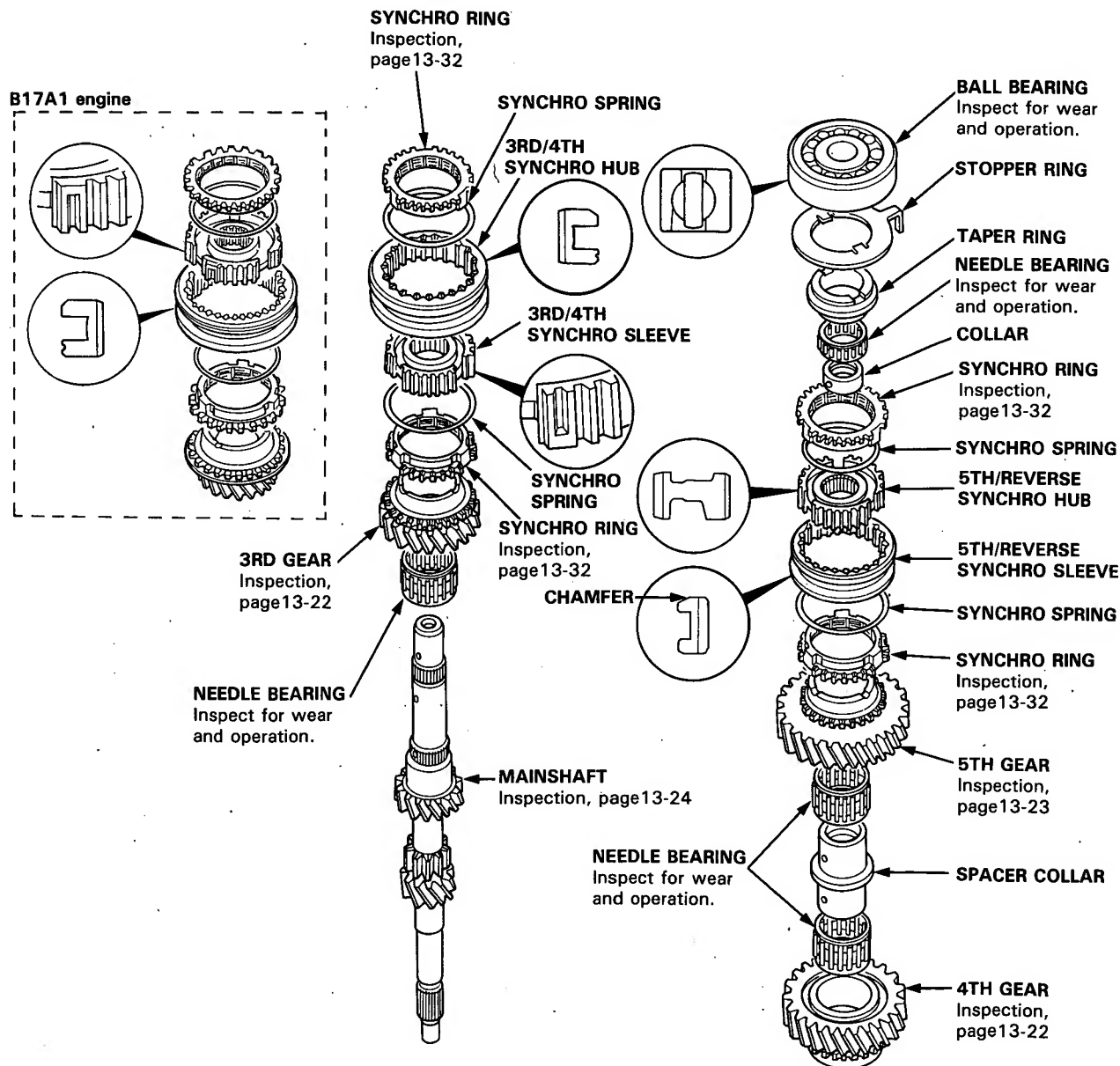
# Mainshaft Assembly



## Index

NOTE: The 3rd/4th and 5th synchro hubs are installed with a press.

 Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact surfaces. The 3rd/4th and 5th synchro hubs, however, should be installed with a press before lubricating them.



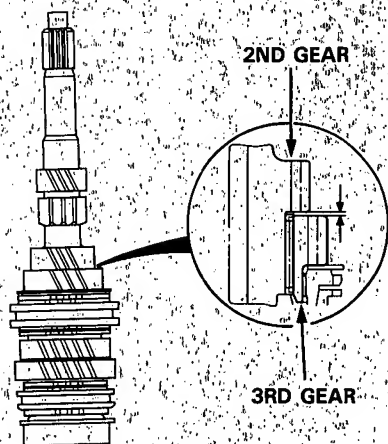
# Mainshaft Assembly

## Clearance Inspection

**NOTE:** If replacement is required, always the synchro sleeve and synchro hubs as a set.

1. Measure the clearance between 2nd and 3rd gears.

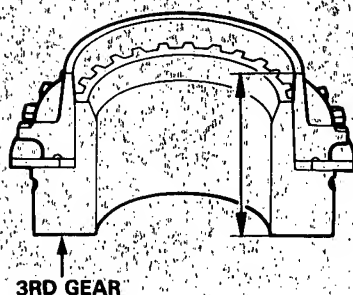
**Standard:** 0.06–0.21 mm  
(0.002–0.008 in)  
**Service Limit:** 0.3 mm (0.012 in)



2. If the clearance exceeds the service limit, measure the thickness of 3rd gear.

**B17A1 engine:**  
**Standard:** 34.92–34.97 mm  
(1.375–1.377 in)  
**Service Limit:** 34.3 mm (1.350 in)

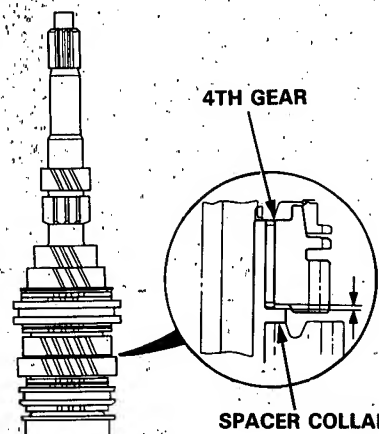
**B18A1 engine:**  
**Standard:** 34.42–34.47 mm  
(1.355–1.357 in)  
**Service Limit:** 33.8 mm (1.331 in)



If the thickness of 3rd gear is less than the service limit, replace of 3rd gear with a new one.  
If the thickness of 3rd gear is within the service limit, replace the 3rd/4th synchro hub with a new one.

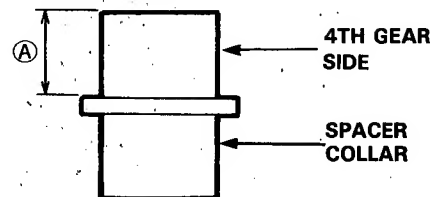
3. Measure the clearance between 4th gear and the spacer collar.

**Standard:** 0.06–0.21 mm  
(0.002–0.008 in)  
**Service Limit:** 0.3 mm (0.012 in)



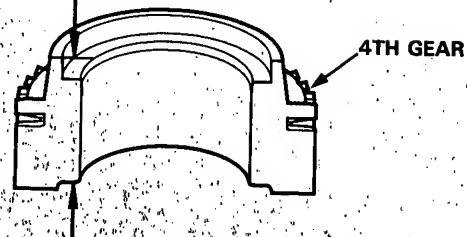
4. If the clearance exceeds the service limit, measure distance (A) on the spacer collar.

**Standard:** 26.03–26.08 mm  
(1.025–1.027 in)



5. If distance (A) is less than the standard, replace the spacer collar with a new one.  
If distance (A) is within the standard, measure the thickness of 4th gear.

**B17A1 engine:**  
**Standard:** 31.42–31.47 mm  
(1.237–1.239 in)  
**Service Limit:** 31.3 mm (1.232 in)  
**B18A1 engine:**  
**Standard:** 30.92–30.97 mm  
(1.217–1.219 in)  
**Service Limit:** 30.8 mm (1.213 in)



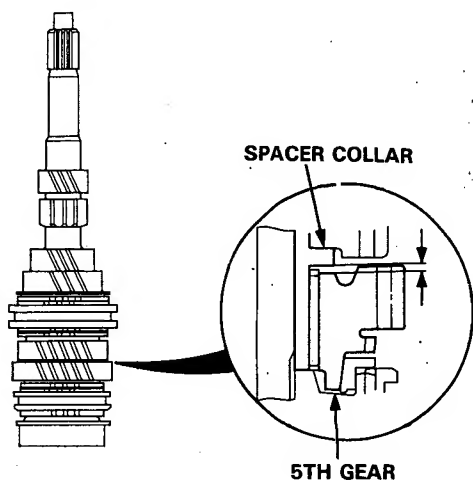
If the thickness of 4th gear is less than the service limit, replace 4th gear with a new one.  
If the thickness of 4th gear is within the service limit, replace the 3rd/4th synchro hub with a new one.





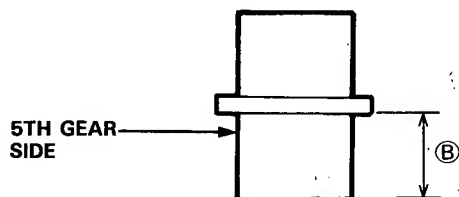
6. Measure the clearance between 5th gear and the spacer collar.

**Standard:** 0.06–0.21 mm  
(0.002–0.008 in)  
**Service Limit:** 0.3 mm (0.012 in)



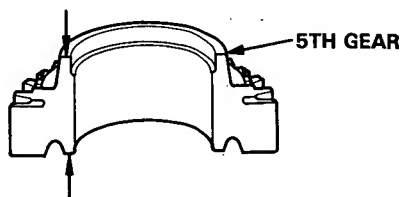
7. If the clearance exceeds the service limit, measure distance ⑧ on the spacer collar.

**Standard:** 26.03–26.08 mm  
(1.025–1.027 in)



8. If distance ⑧ is less than the standard, replace the spacer collar with a new one.  
If distance ⑧ is within the standard, measure the thickness of 5th gear.

**Standard:** 31.42–31.47 mm  
(1.237–1.239 in)  
**Service Limit:** 31.3 mm (1.232 in)

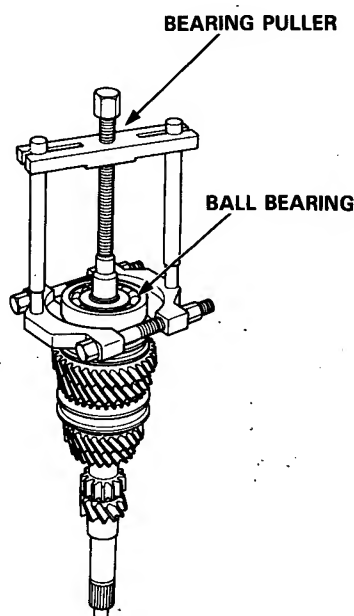


If the thickness of 5th gear is less than the service limit, replace 5th gear with a new one.  
If the thickness of 5th gear is within the service limit, replace the 5th/reverse synchro hub with a new one.

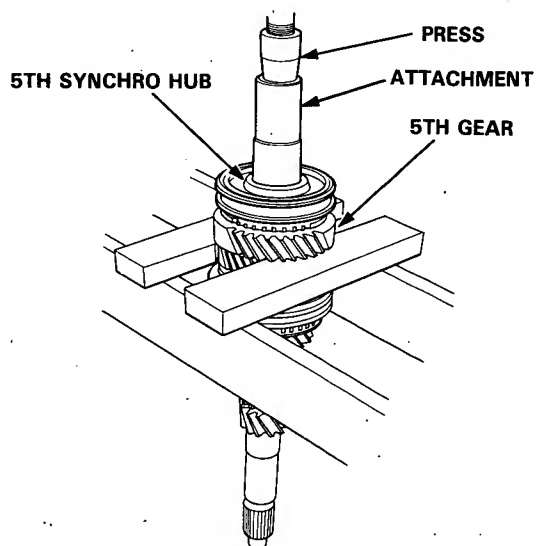
## Disassembly

**CAUTION:** Remove the synchro hubs using a press and steel blocks as shown. Use of a jow-type puller can cause damage to the gear teeth.

1. Remove the ball bearing using the bearing puller as shown.



2. Support 5th gear on steel blocks as shown and press the mainshaft out of the 5th synchro hub.

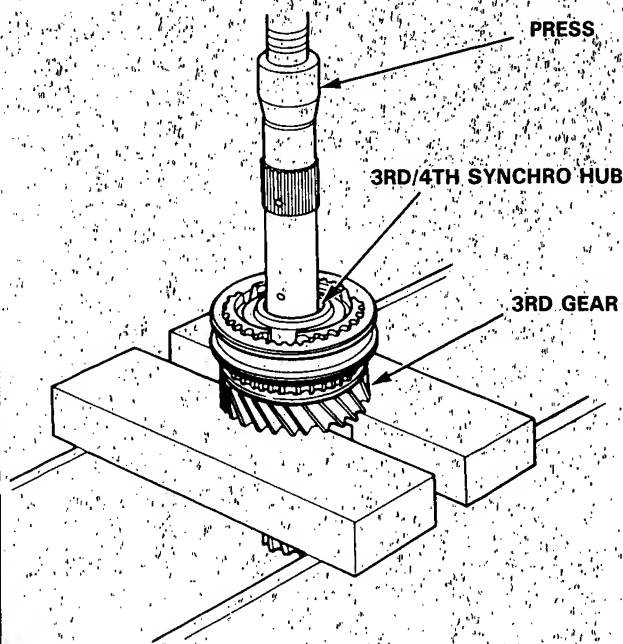


(cont'd)

# Mainshaft Assembly

## Disassembly (cont'd)

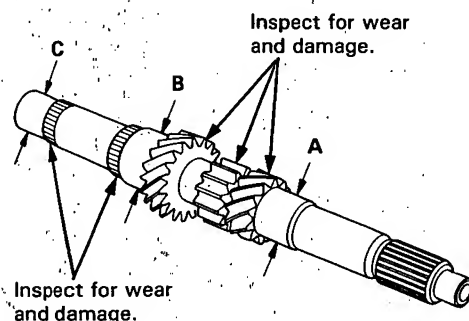
3. Support 3rd gear on steel blocks and press the mainshaft out of the 3rd/4th synchro hub.



## Inspection

1. Inspect the surface and bearing surface for wear and damage, then measure the mainshaft at points A, B, and C.

Standard:	A: 27.977–27.990 mm (1.1015–1.1020 in)
	B: 37.984–38.000 mm (1.4954–1.4960 in)
	C: 27.987–28.000 mm (1.1018–1.1024 in)
Service Limit:	A: 27.930 mm (1.0996 in)
	B: 37.930 mm (1.4933 in)
	C: 27.940 mm (1.1000 in)

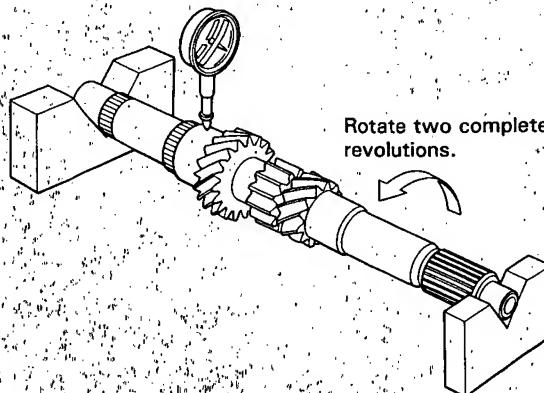


If any part of the mainshaft is less than the service limit, replace it with a new one.

2. Inspect for runout.

Standard:	0.02 mm (0.001 in)
Service Limit:	0.05 mm (0.002 in)

NOTE: Support the mainshaft at both ends as shown.



If the runout exceeds the service limit, replace the mainshaft with a new one.



## Reassembly

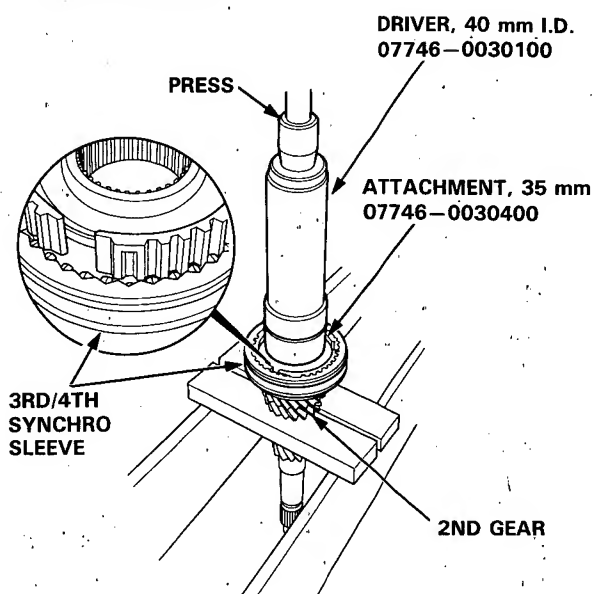
### CAUTION:

- Press the 3rd/4th and 5th synchro hubs on the main shaft without lubrication.
- When installing the 3rd/4th and 5th synchro hubs, support the shaft on steel blocks and install the synchro hubs using a press.
- Install the 3rd/4th and 5th synchro hubs with a maximum pressure of 20 kN (2,000 kg, 4,400 lbs).

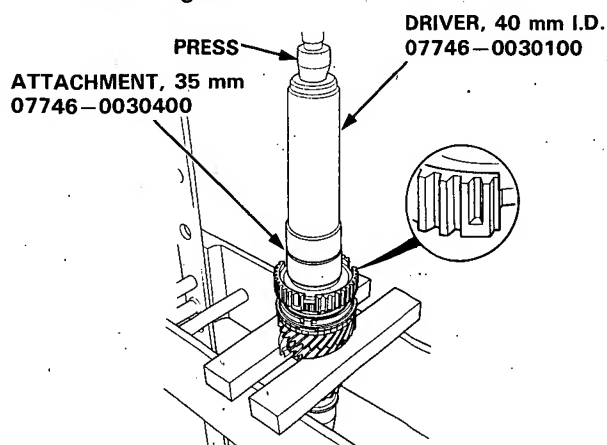
NOTE: To reassemble, see page 13-21.

1. Support 2nd gear on steel blocks as shown, then install the 3rd/4th synchro hub using the special tools and a press as shown.

#### B17A1 engine:

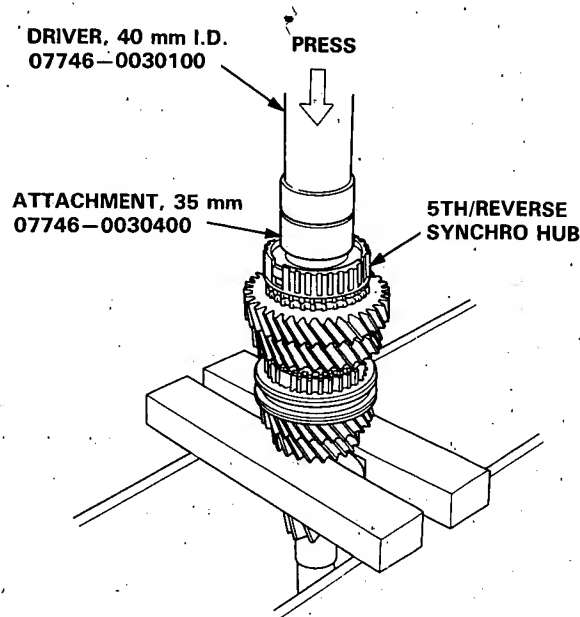


#### B18A1 engine:

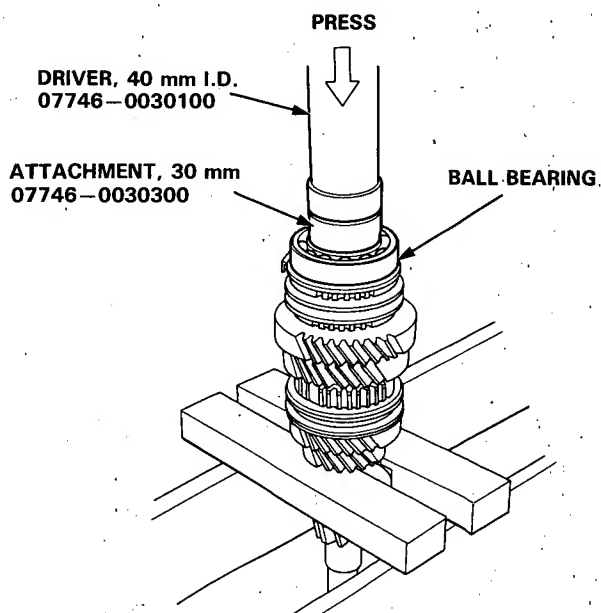


2. After installing, check the operation of the 3rd/4th synchro hub set.

3. Install the 5th/reverse synchro hub using the special tools and a press as shown.




4. Install the ball bearing using the special tools and a press as shown.

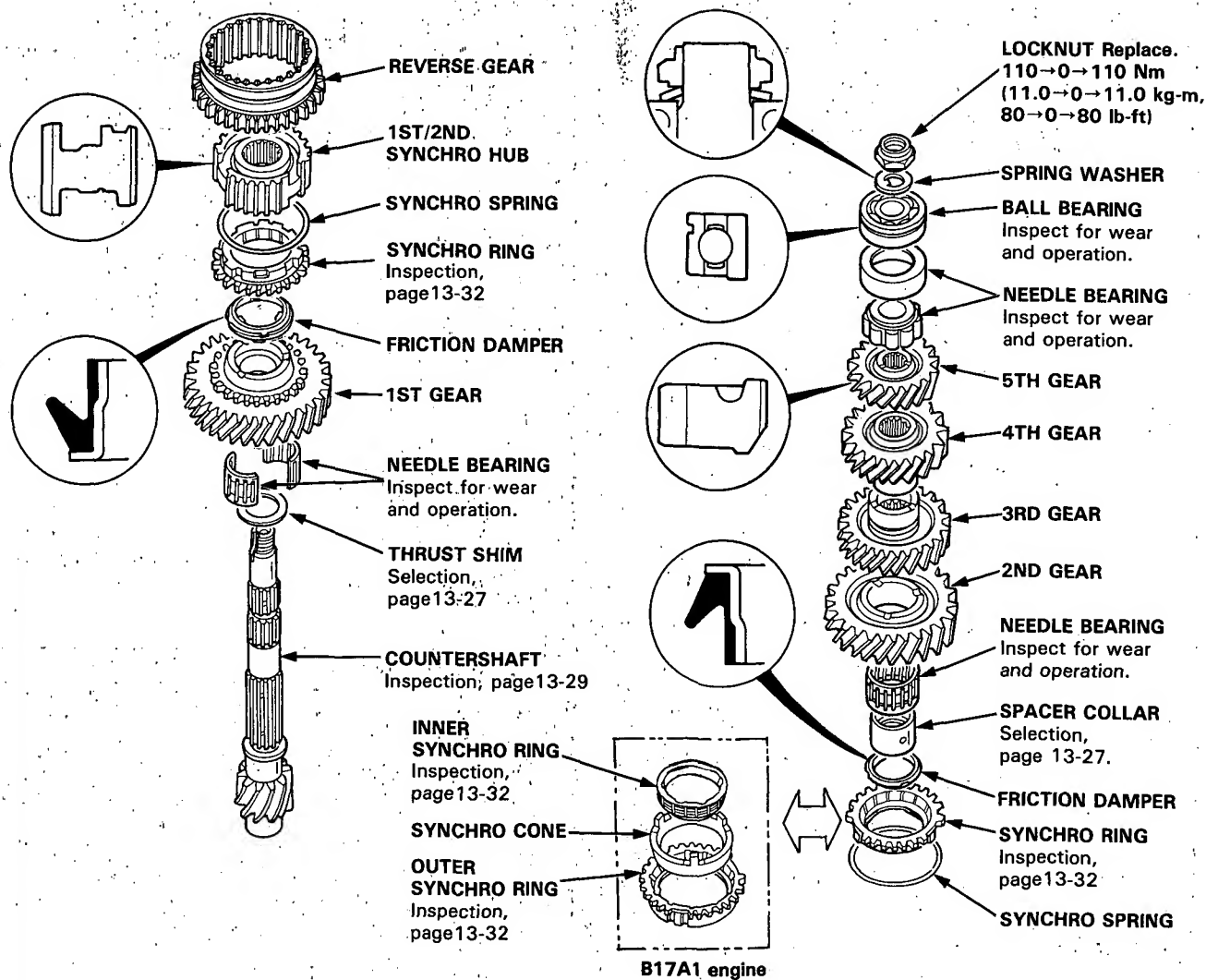


# Countershaft Assembly

## Index

NOTE: The 4th and 5th gears are installed with a press.

 Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact surfaces. 4th and 5th gears should be installed without lubrication using a press.

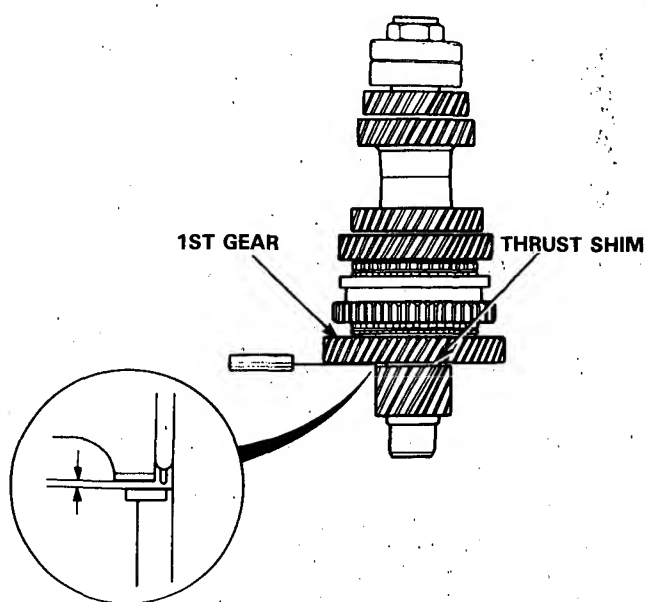




## Clearance Inspection

1. Measure the clearance between 1st gear and the thrust shim.

Standard: 0.04–0.12 mm  
(0.002–0.005 in)  
Service Limit: 0.18 mm (0.007 in)

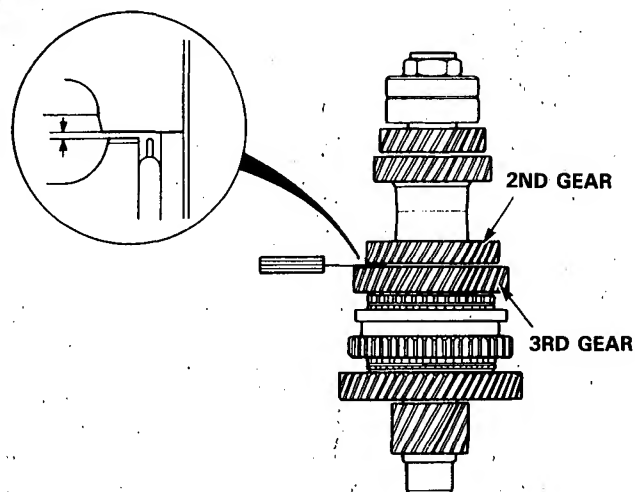


2. If the clearance exceeds the service limit, select the appropriate thrust shim for the correct clearance from the chart below.

	Part Number	Thickness
A	23921–PK5–900	1.95 mm (0.0768 in)
B	23922–PK5–900	1.96 mm (0.0772 in)
C	23923–PK5–900	1.97 mm (0.0776 in)
D	23924–PK5–900	1.98 mm (0.0780 in)
E	23925–PK5–900	1.99 mm (0.0783 in)
F	23926–PK5–900	2.00 mm (0.0787 in)
G	23927–PK5–900	2.01 mm (0.0791 in)
H	23928–PK5–900	2.02 mm (0.0795 in)
I	23929–PK5–900	2.03 mm (0.0799 in)
J	23930–PK5–900	2.04 mm (0.0803 in)
K	23931–PK5–900	2.05 mm (0.0807 in)
L	23932–PK5–900	2.06 mm (0.0811 in)
M	23933–PK5–900	2.07 mm (0.0815 in)
N	23934–PK5–900	2.08 mm (0.0819 in)
O	23935–PK5–900	2.09 mm (0.0823 in)
P	23936–PK5–900	2.10 mm (0.0827 in)

3. Measure the clearance between 2nd and 3rd gears.

Standard: 0.05–0.12 mm  
(0.002–0.005 in)  
Service Limit: 0.18 mm (0.007 in)



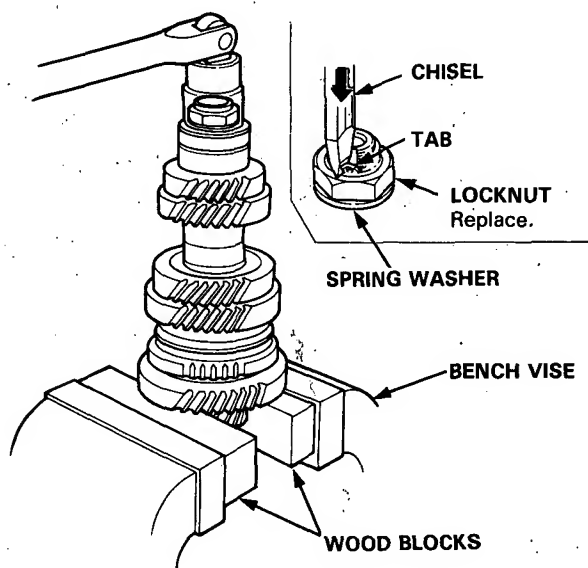
4. If the clearance exceeds the service limit, select the appropriate spacer collar for the correct clearance from the chart below.

	Part Number	Thickness
A	23917–P21–010	29.02–29.04 mm (1.1425–1.1433 in)
B	23918–P21–010	29.07–29.09 mm (1.1445–1.1453 in)

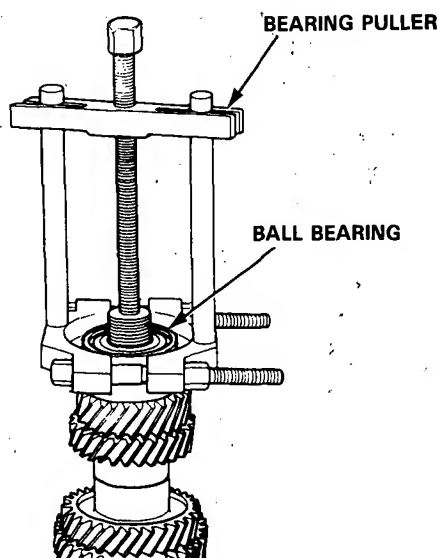
# Countershaft Assembly

## Disassembly

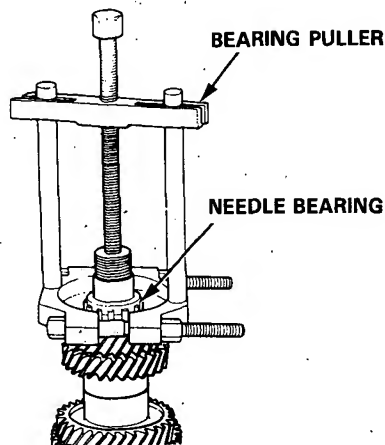
1. Securely clamp the countershaft assembly in a bench vise with wood blocks.
2. Raise the locknut tab from the groove of the countershaft and remove the locknut and the spring washer.



3. Remove the ball bearing using a bearing puller as shown.

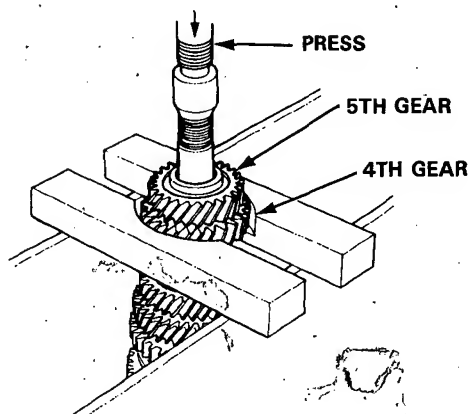


4. Remove the bearing outer race from the needle bearing, then remove the needle bearing using a bearing puller as shown.



**CAUTION:** Remove the gears using a press and steel blocks as shown. Use of a jow-type puller can damage the gear teeth.

5. Support 4th gear on steel blocks as shown and press the countershaft out of 5th and 4th gears.



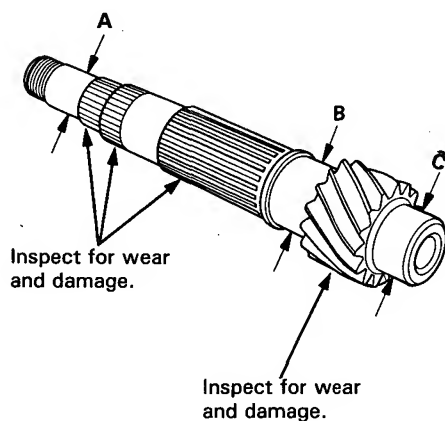


## Inspection

1. Inspect the surface and bearing surface for wear and damage, then measure the countershaft at points A, B, and C.

**Standard:** A: 24.980–24.993 mm (0.9835–0.9840 in)  
B: 36.984–37.000 mm (1.4561–1.4567 in)  
C: 33.000–33.015 mm (1.2992–1.2998 in)

**Service Limit:** A: 24.940 mm (0.9819 in)  
B: 36.930 mm (1.4539 in)  
C: 32.950 mm (1.2972 in)

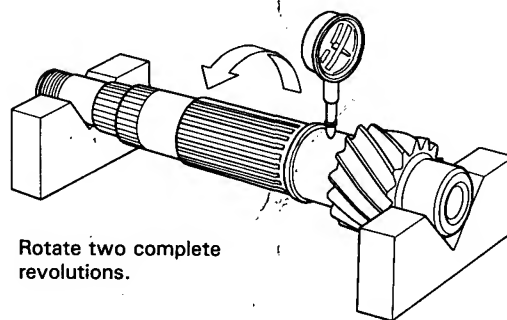


If any part of the countershaft is less than the service limit, replace it with a new one.

2. Inspect for runout.

**Standard:** 0.02 mm (0.001 in)  
**Service Limit:** 0.05 mm (0.002 in)

**NOTE:** Support the countershaft at both ends as shown.



Rotate two complete revolutions.

If the runout exceeds the service limit, replace the countershaft with a new one.

# Countershaft Assembly

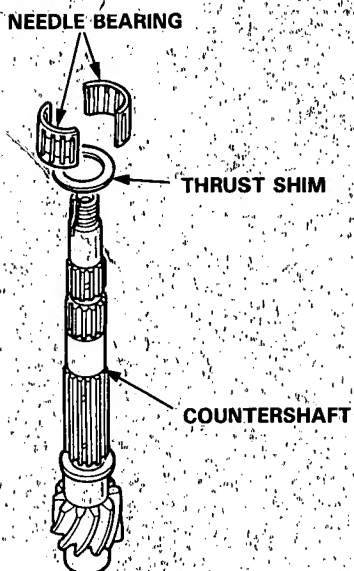
## Reassembly

### CAUTION:

- Press the 4th and 5th gears on the countershaft without lubrication
- When installing the 4th and 5th gears, support the shaft on steel blocks and install the gears using a press.
- Install the 4th and 5th gears with a maximum pressure of 26 kN (2,600 kg, 5,720 lbs).

NOTE: To reassemble, see page 13-26.

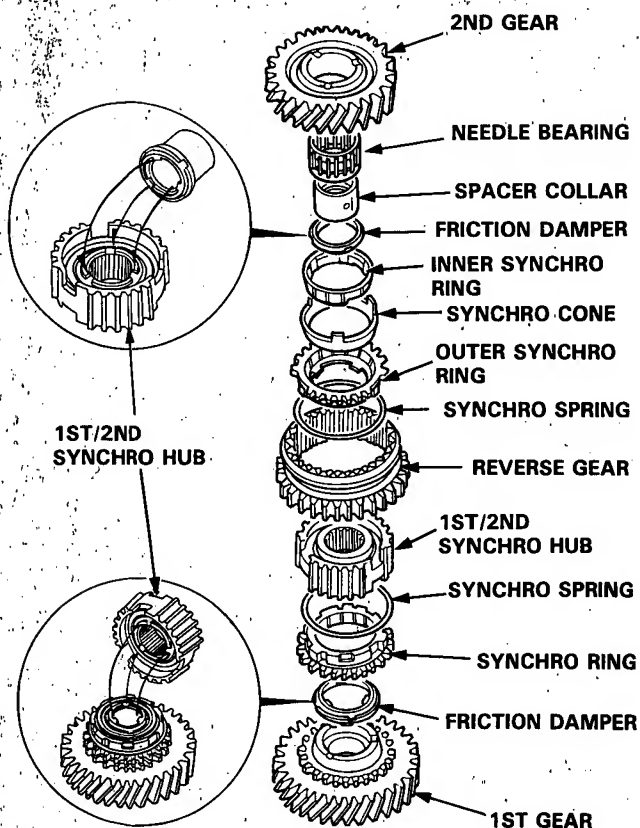
1. Install the thrust shim and needle bearing on the countershaft.



2. Assemble the parts below as shown.

### NOTE:

- Check that the fingers of the friction damper is securely set in the grooves of the 1st/2nd synchro hub.
- B17A1 engine type is shown.

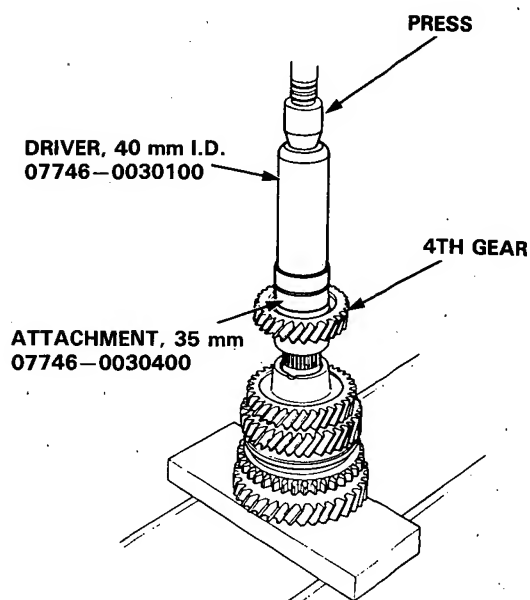


3. Place the parts assembled in Step 2, then install the parts on the countershaft.

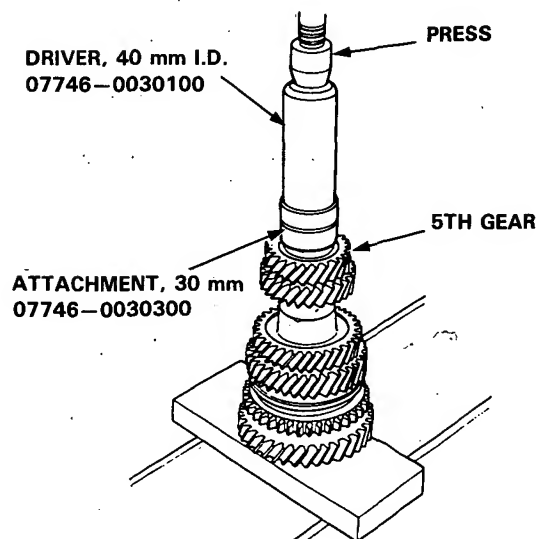




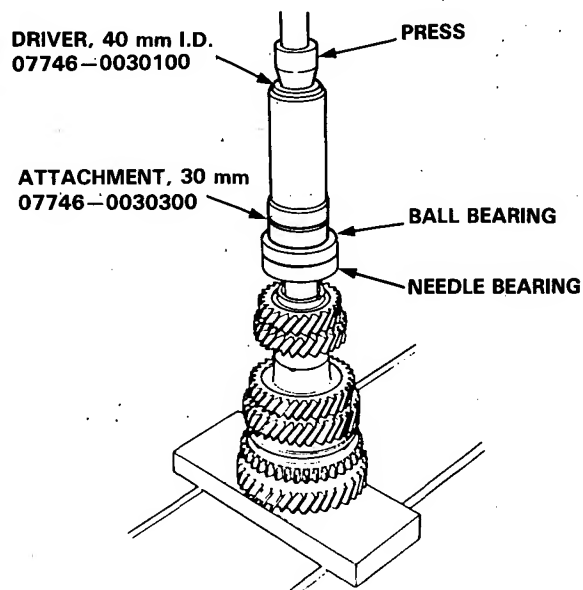
4. Support the countershaft on a steel block and install 4th gear using the special tools and a press as shown.



5. Install 5th gear using the special tools and a press as shown.

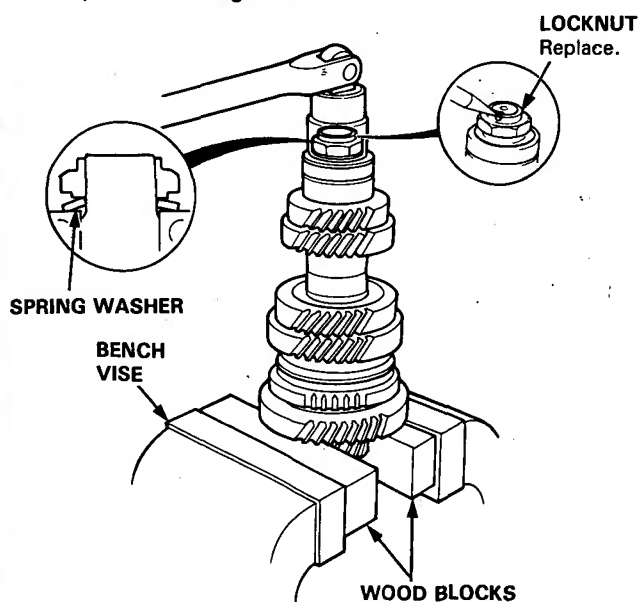


6. Install the needle bearing, then install the ball bearing using the special tools and a press as shown.



7. Securely clamp the countershaft assembly in a bench vise with wood blocks.
8. Install the spring washer, tighten the new locknut, then stake the locknut tab into groove.

**LOCKNUT**  
110→0→110 N·m  
(11→0→11 kg-m, 80→0→80 lb-ft)



# Synchro Ring, Gear

## Inspection

1. Inspect the synchro ring and gear.

A: Inspect the inside of the synchro ring for wear.

B: Inspect the synchro sleeve teeth and matching teeth on the synchro ring for wear (rounded off).



C: Inspect the synchro sleeve teeth and matching teeth on the gear for wear (rounded off).



D: Inspect the gear hub thrust surface for wear.

E: Inspect the cone surface for wear and roughness.

F: Inspect the teeth on all gears for uneven wear, scoring, galling and cracks.

2. Coat the cone surface of the gear with oil and place the synchro ring on the matching gear. Rotate the ring, making sure that it does not slip.

Measure the clearance between the synchro ring and gear all the way around.

NOTE: Hold the synchro ring against the gear evenly while measuring the clearance.

### Ring-to-Gear Clearance

Standard: 0.85–1.10 mm  
(0.033–0.044 in)

Service Limit: 0.4 mm (0.016 in)

### Double Cone Synchro-to Gear Clearance

Standard:

(A) (Outer Synchro Ring to Synchro Cone)  
0.5–1.0 mm (0.020–0.039 in)

(B) (Synchro Cone to Gear)  
0.5–1.0 mm (0.020–0.039 in)

(C) (Outer Synchro Ring to Gear)  
0.95–1.68 mm (0.037–0.066 in)

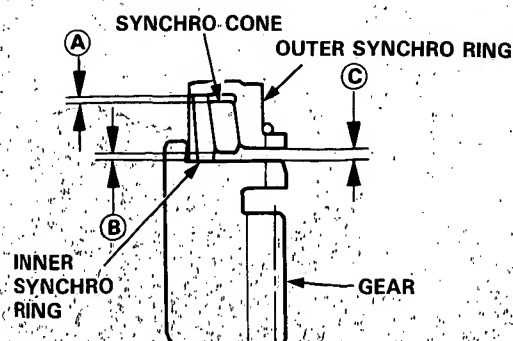
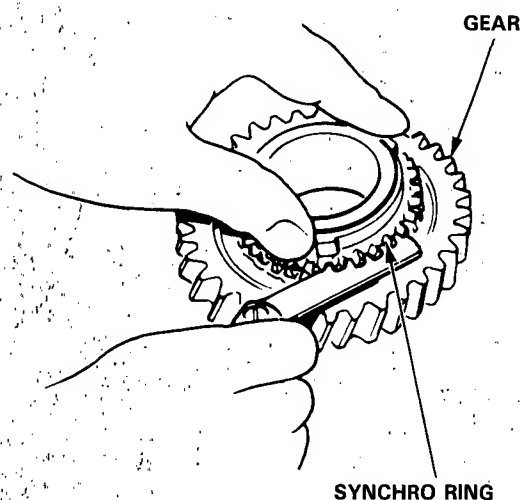
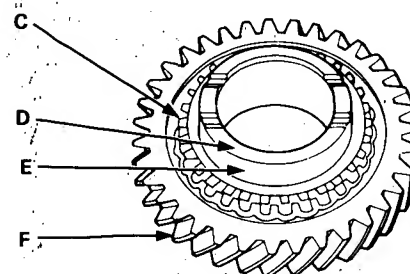
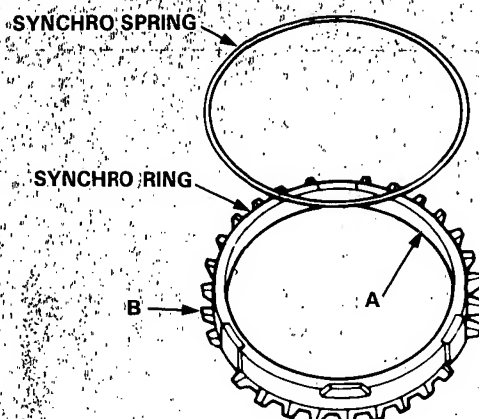
Service Limit:

(A) 0.3 mm (0.012 in)

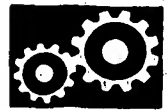
(B) 0.3 mm (0.012 in)

(C) 0.6 mm (0.024 in)

If the clearance is less than the service limit, replace the synchro ring and synchro cone.



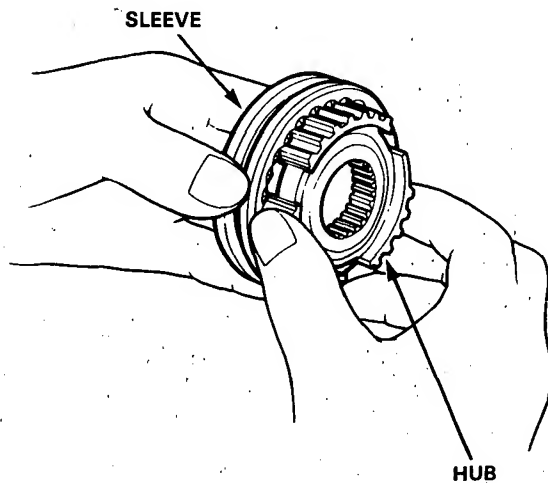
# Synchro Sleeve, Synchro Hub



## Inspection

1. Inspect gear teeth on all synchro hubs and synchro sleeves for rounded off corners, which indicates wear.
2. Install each synchro hub in its mating synchro sleeve and check for freedom of movement.

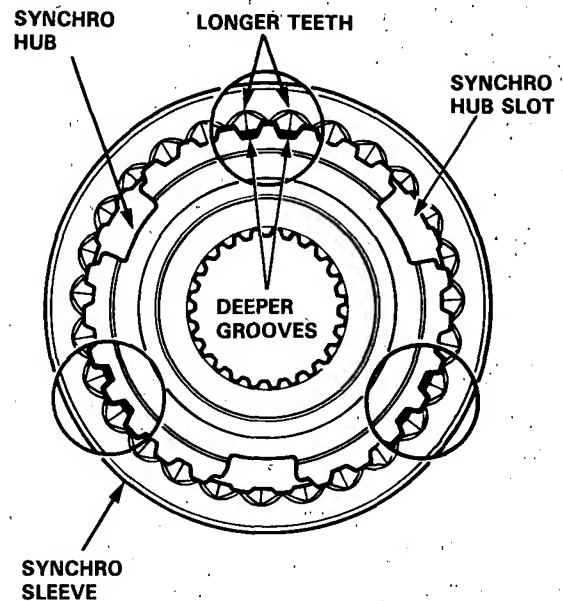
NOTE: If replacement is required, always replace the synchro sleeve and synchro hub as a set.



## Installation

Each synchro sleeve has three sets of longer teeth (120 degrees apart) that must be matched with the three sets of deeper grooves in the synchro hub when assembled.

NOTE: If replacement is required, always replace the synchro sleeve and hub as a set.

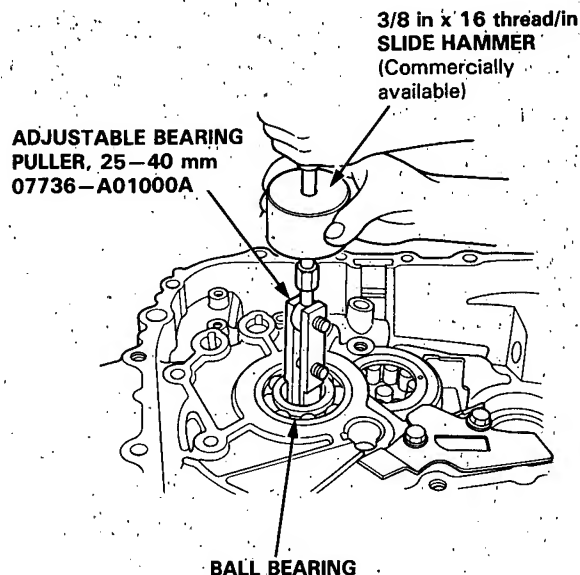


# Clutch Housing Bearing

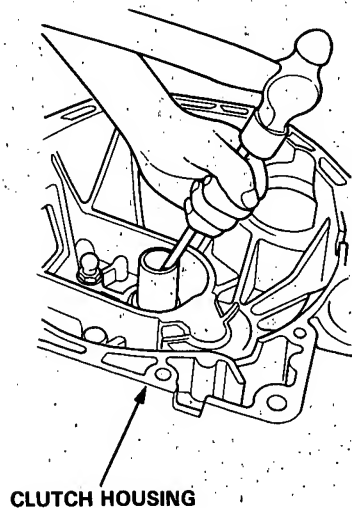
## Replacement

### Mainshaft

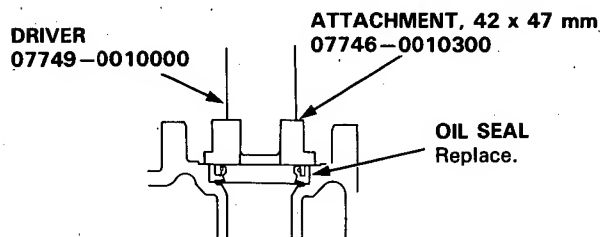
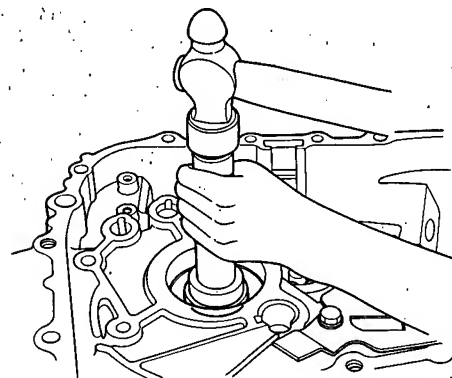
1. Remove the ball bearing using the special tools as shown.



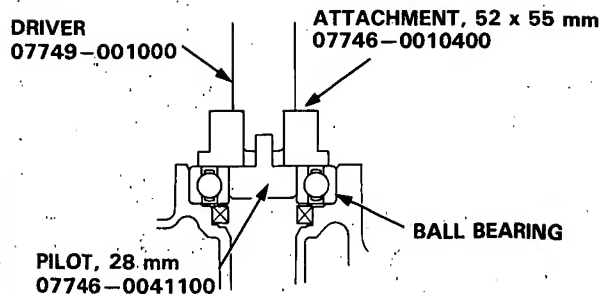
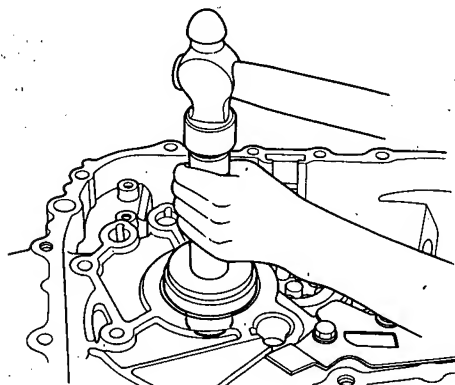
2. Remove the oil seal from the clutch housing.



3. Drive the new oil seal into the clutch housing using the special tools as shown.



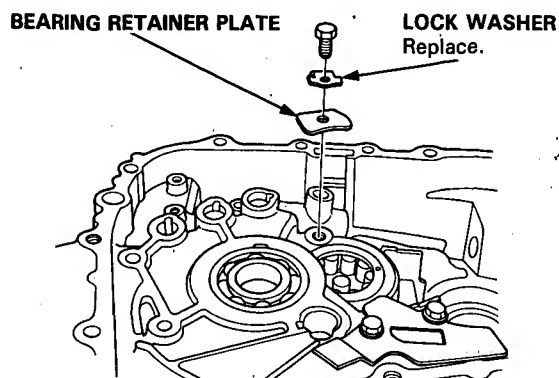
4. Drive the ball bearing into the clutch housing using the special tools as shown.



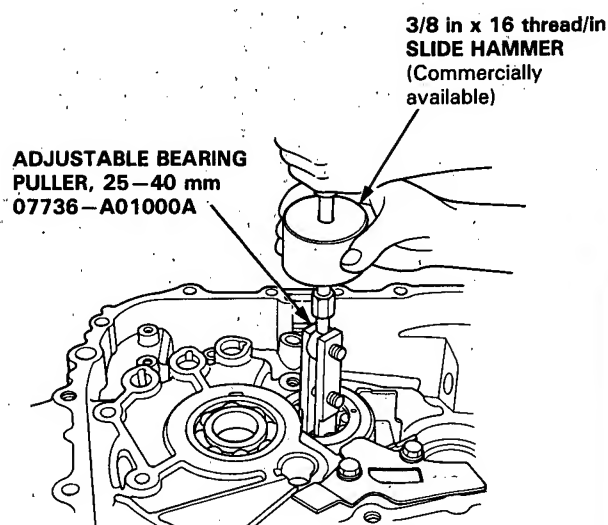


### Countershaft

1. Bend the tab on the lock washer down, then remove the bolt and bearing retainer plate.

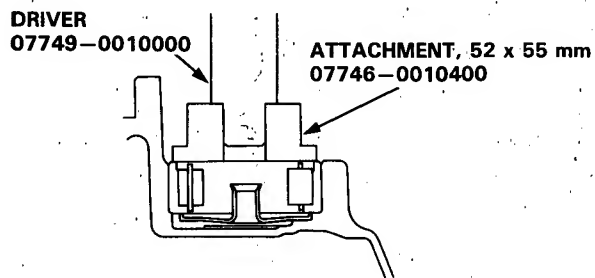
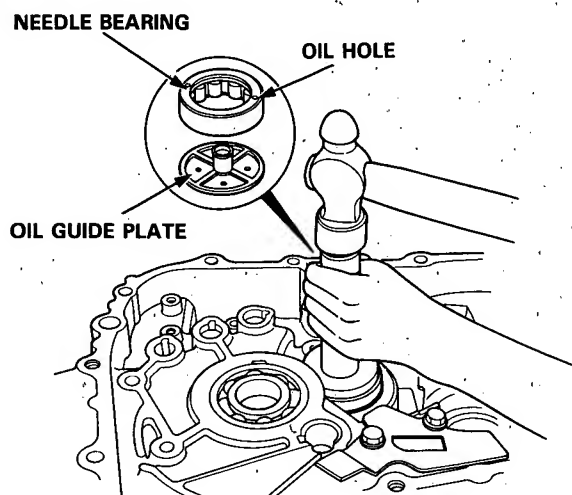


2. Remove the needle bearing using the special tools as shown, and remove the oil guide plate.

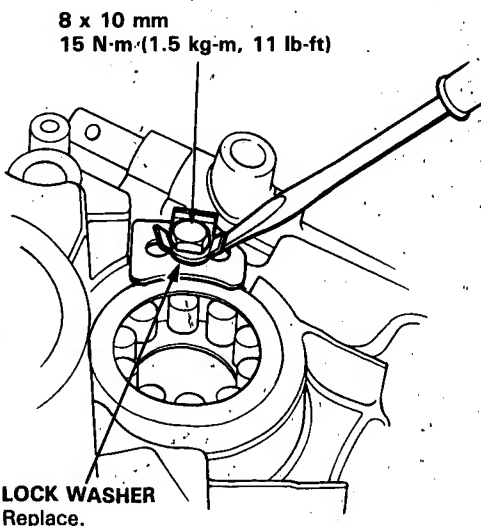


3. Install the oil guide plate, then drive the needle bearing into the clutch housing using the special tools as shown.

NOTE: Position the needle bearing with the oil hole facing up.



4. Install the bearing retainer plate and new lock washer, then bend the tab against the bolt head.

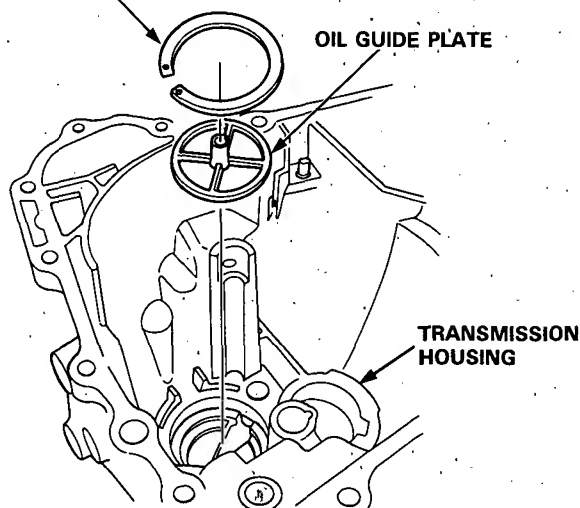


# Mainshaft Thrust Shim

## Adjustment

1. Remove the 72 mm thrust shim and oil guide plate from the transmission housing.

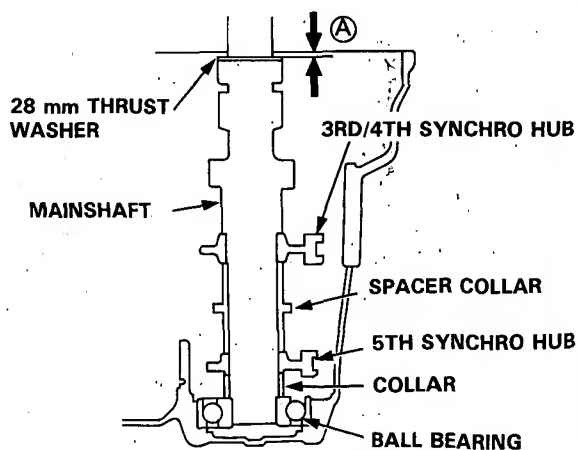
72 mm THRUST SHIM



2. Install the 3rd/4th synchro hub, spacer collar, 5th synchro hub, collar, ball bearing, and 28 mm thrust washer on the mainshaft. Install the assembly in the transmission housing.
3. Measure the distance **(A)** between the end of the transmission housing and 28 mm thrust washer.

### NOTE:

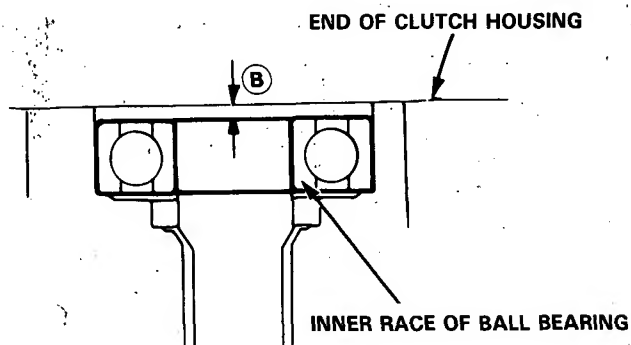
- Use a straight edge and feeler gauge.
- Measure at three locations and average the readings.



4. Measure the distance **(B)** between the surfaces of the clutch housing and bearing inner race.

### NOTE:

- Use a straight edge and feeler gauge.
- Measure at three locations and average the readings.



5. Select the proper thrust shim on the basis of the following calculations;

NOTE: Use only one shim.

(Basic Formula)

$$\text{(A)} + \text{(B)} - 1.00 = \text{shim thickness}$$

### Example of calculation:

Distance **(A)** (2.05 mm) + Distance **(B)** (0.09 mm)  
= 2.14 mm subtract the spring washer height  
(1.00 mm) = the required thrust shim (1.14 mm)



## 72 mm THRUST SHIM

	Part Number	Thickness
A	23931-P21-000	0.60 mm (0.0236 in)
B	23932-P21-000	0.63 mm (0.0248 in)
C	23933-P21-000	0.66 mm (0.0260 in)
D	23934-P21-000	0.69 mm (0.0272 in)
E	23935-P21-000	0.72 mm (0.0283 in)
F	23936-P21-000	0.75 mm (0.0295 in)
G	23937-P21-000	0.78 mm (0.0307 in)
H	23938-P21-000	0.81 mm (0.0319 in)
I	23939-P21-000	0.84 mm (0.0331 in)
J	23940-P21-000	0.87 mm (0.0343 in)
K	23941-P21-000	0.90 mm (0.0354 in)
L	23942-P21-000	0.93 mm (0.0366 in)
M	23943-P21-000	0.96 mm (0.0378 in)
N	23944-P21-000	0.99 mm (0.0390 in)
O	23945-P21-000	1.02 mm (0.0402 in)
P	23946-P21-000	1.05 mm (0.0413 in)
Q	23947-P21-000	1.08 mm (0.0425 in)
R	23948-P21-000	1.11 mm (0.0437 in)
S	23949-P21-000	1.14 mm (0.0449 in)
T	23950-P21-000	1.17 mm (0.0461 in)
U	23951-P21-000	1.20 mm (0.0472 in)
V	23952-P21-000	1.23 mm (0.0484 in)
W	23953-P21-000	1.26 mm (0.0496 in)
X	23954-P21-000	1.29 mm (0.0508 in)
Y	23955-P21-000	1.32 mm (0.0520 in)
Z	23956-P21-000	1.35 mm (0.0531 in)
AA	23957-P21-000	1.38 mm (0.0543 in)
AB	23958-P21-000	1.41 mm (0.0555 in)
AC	23959-P21-000	1.44 mm (0.0567 in)
AD	23960-P21-000	1.47 mm (0.0579 in)
AE	23961-P21-000	1.50 mm (0.0591 in)
AF	23962-P21-000	1.53 mm (0.0602 in)
AG	23963-P21-000	1.56 mm (0.0614 in)
AH	23964-P21-000	1.59 mm (0.0626 in)
AI	23965-P21-000	1.62 mm (0.0638 in)
AJ	23966-P21-000	1.65 mm (0.0650 in)
AK	23967-P21-000	1.68 mm (0.0661 in)
AL	23968-P21-000	1.71 mm (0.0673 in)
AM	23969-P21-000	1.74 mm (0.0685 in)
AN	23970-P21-000	1.77 mm (0.0697 in)
AO	23971-P21-000	1.80 mm (0.0709 in)

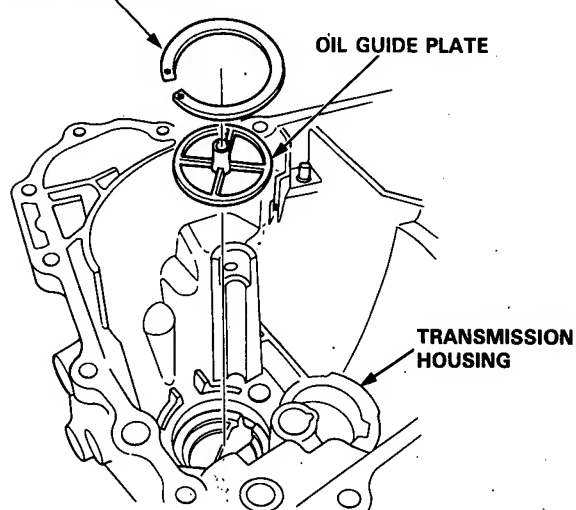
6. Check the thrust clearance in the manner described below.

### NOTE:

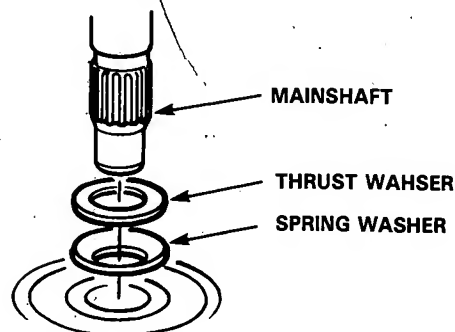
- Clean the thrust washer, spring washer and shim thoroughly before installation.
- Install the thrust washer, spring washer and shim properly.

- a. Install the 72 mm thrust shim selected and oil guide plate in the transmission housing.

72 mm THRUST SHIM



- b. Install the thrust washer and spring washer in the mainshaft.



- c. Install the mainshaft in the clutch housing.  
d. Place the transmission housing over the mainshaft and onto the clutch housing.  
e. Tighten the clutch and transmission housings with several 8 mm bolts.  
f. Tap the mainshaft with a plastic hammer.

(cont'd)

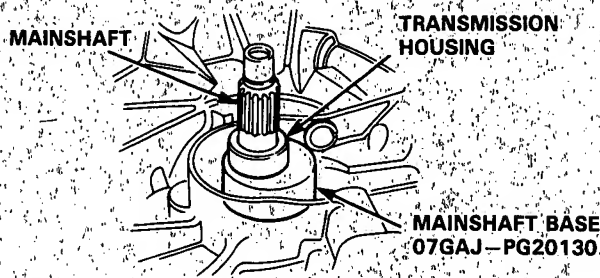
# Mainshaft Thrust Shim

## Adjustment (cont'd)

7. Check the thrust clearance in the manner described below.

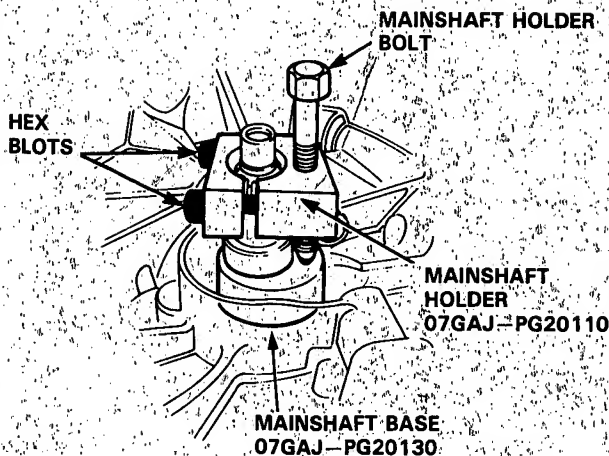
**NOTE:** Measurement should be made at room temperature.

- a. Slide the mainshaft base and the collar over the mainshaft.



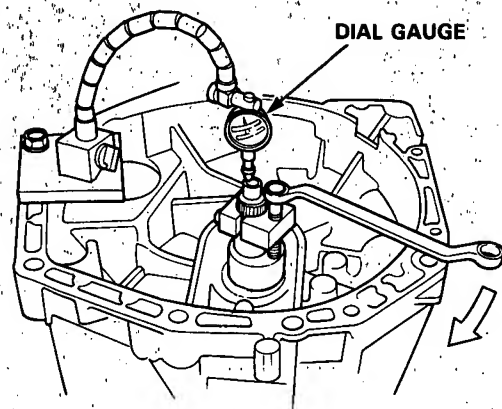
- b. Attach the mainshaft holder to the mainshaft as follows:

- Back-out the mainshaft holder bolt and loosen the two hex bolts.
- Fit the holder over the mainshaft so its lip is towards the transmission.
- Align the mainshaft holder's lip around the groove at the inside of the mainshaft splines, then tighten the hex bolts.



- c. Seat the mainshaft fully by tapping its end with a plastic hammer.
- d. Thread the mainshaft holder bolt in until it just contacts the wide surface of the mainshaft base.

- e. Zero a dial gauge on the end of the mainshaft.



- f. Turn the mainshaft holder bolt clockwise; stop turning when the dial gauge has reached its maximum movement. The reading on the dial gauge is the amount of mainshaft end play.

**CAUTION:** Turning the mainshaft holder bolt more than 60 degrees after the needle of the dial gauge stops moving may damage the transmission.

- g. If the reading is within the standard, the clearance is correct. If the reading is not within the standard, recheck the shim thickness.

**Standard:** 0.11—0.18 mm (0.004—0.007 in)

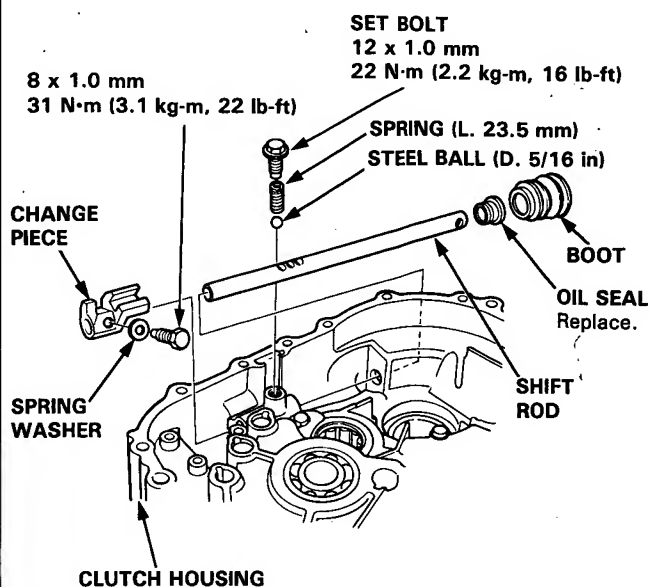




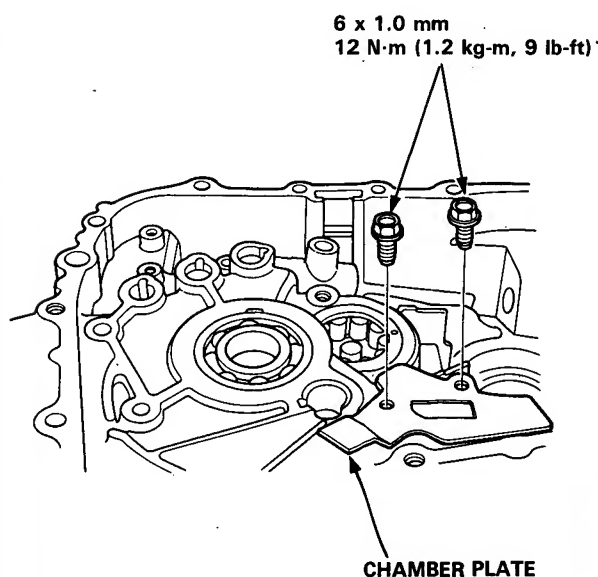
# Transmission

## Reassembly

1. Set the change piece on the clutch housing.
2. Install the shift rod.
3. Install the steel ball, spring, and set bolt.
4. Install the change piece attaching bolt.

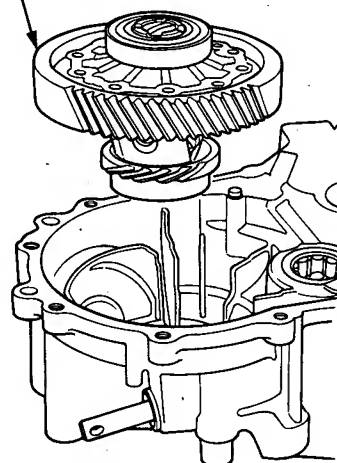


5. Install the chamber plate.



6. Install the differential assembly.

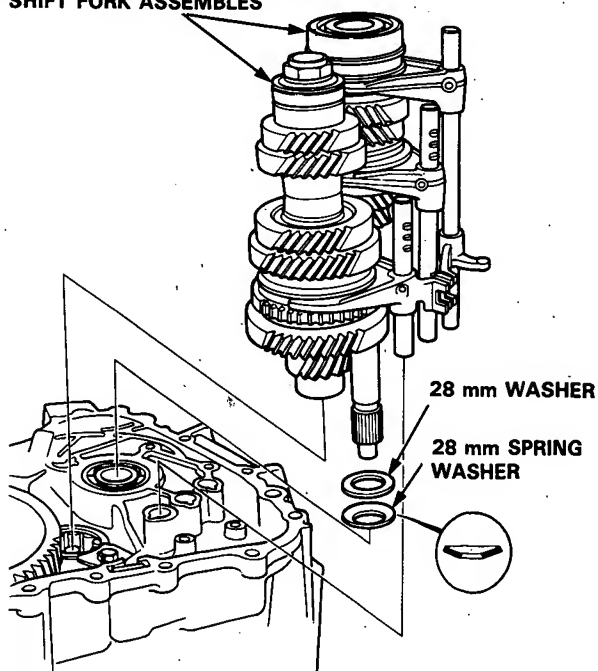
### DIFFERENTIAL ASSEMBLY



7. Set the 28 mm spring washer and washer.
8. Install the mainshaft, countershaft, and shift fork assemblies.

NOTE: Align the finger of the interlock and groove of the shift fork shaft.

### MAINSHAFT, COUNTERSHAFT, SHIFT FORK ASSEMBLIES



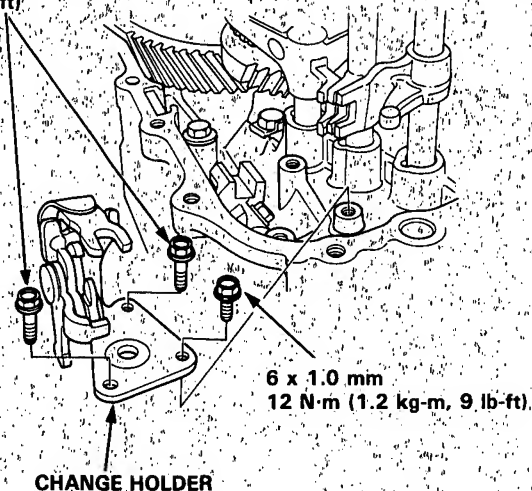
(cont'd)

# Transmission

## Reassembly (cont'd)

9. Install the change holder:

6 x 1.0 mm  
15 N·m (1.5 kg·m,  
1.1 lb-ft)



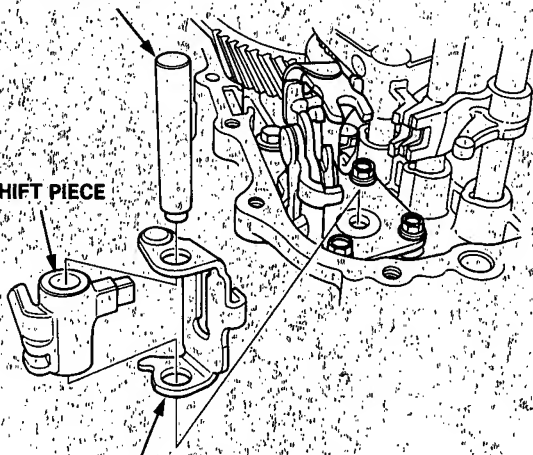
6 x 1.0 mm  
12 N·m (1.2 kg·m, 9 lb-ft)

10. Install the shift piece and interlock, then install the shift piece shaft:

SHIFT PIECE SHAFT

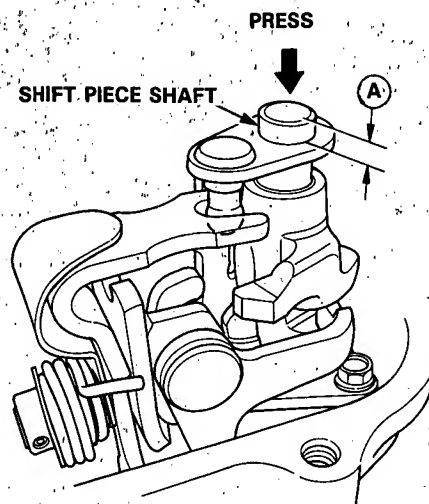
SHIFT PIECE

INTERLOCK



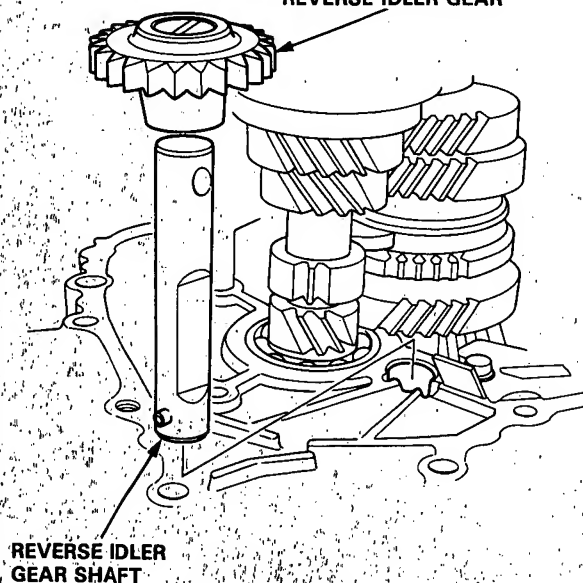
11. Apply light hand pressure to the shift piece shaft and measure distance (A).  
If the distance is not correct, check installation.

Distance A: 11.9–12.3 mm (0.469–0.484 in)



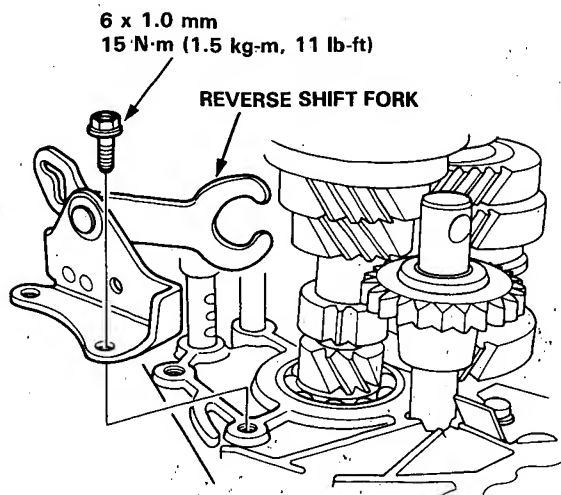
12. Shift the 3rd/4th shift fork to the 4th gear side, then install the reverse idler gear and reverse idler gear shaft.

REVERSE IDLER GEAR

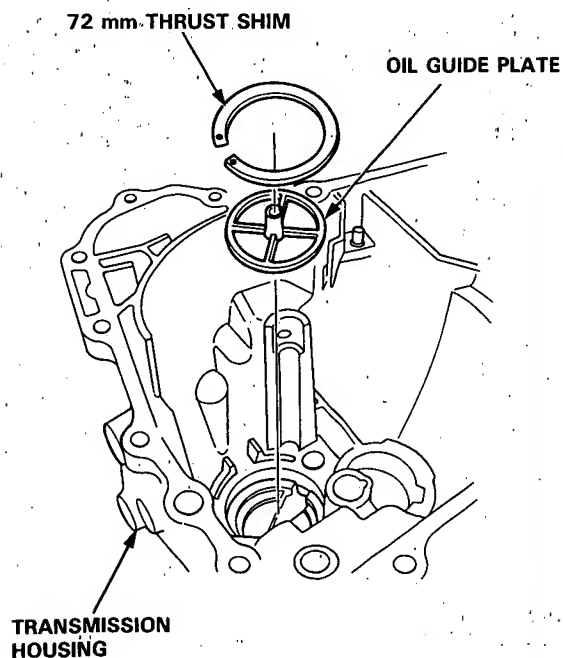




13. Install the reverse shift fork.



14. Install the oil guide plate and 72 mm thrust shim into the transmission housing.

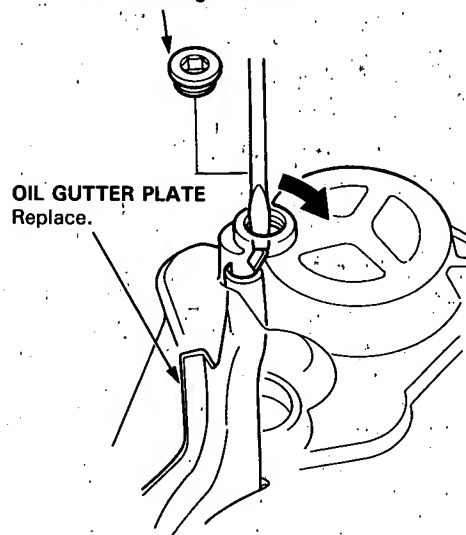


15. Install the oil gutter plate.

16. Bend the hook of the oil gutter plate, then install the 16 mm sealing bolt.

NOTE: Apply liquid gasket (P/N 08718-0001) to the threads.

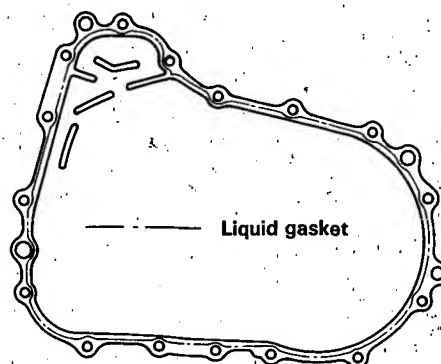
16 mm SEALING BOLT  
30 N·m (3.0 kg-m, 22lb-ft)



17. Apply liquid gasket to the surface of the transmission housing mating with the clutch housing as shown.

NOTE:

- Use liquid gasket (P/N 08718-0001).
- Remove the dirt oil from the sealing surface.
- Apply liquid gasket on the central part of the sealing surface.
- If 20 minutes have passed after applying liquid gasket, reapply it and assemble the housings and allow it to cure at least 30 minutes after assembly before filling transmission with oil.



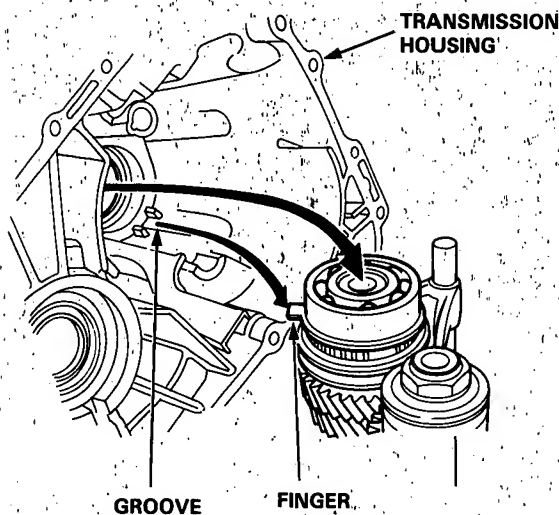
(cont'd)

# Transmission

## Reassembly (cont'd)

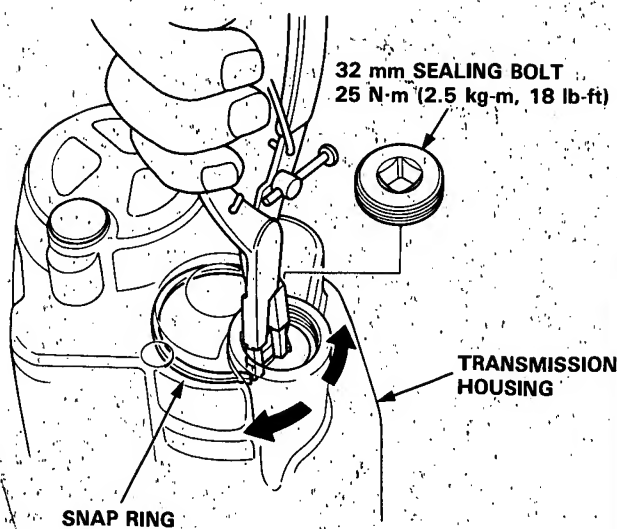
18. Install the 14 x 20 mm dowel pins.

19. Install the transmission housing by aligning the groove in the transmission housing with finger on the stopper ring.



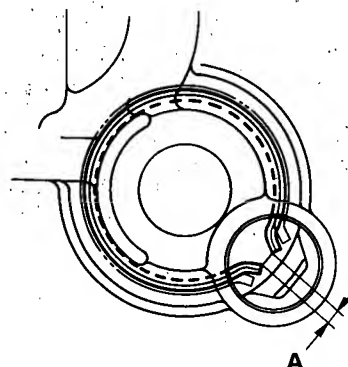
20. Lower the transmission housing with the snap ring pliers and set the snap ring in the groove of the countershaft bearing.

NOTE: Apply liquid gasket (P/N 08718-0001) to the threads of the 32 mm sealing bolt.



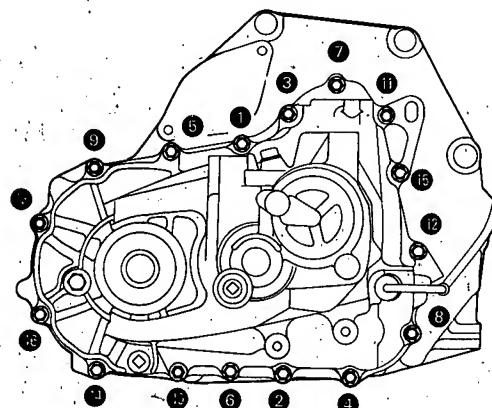
21. Check that the snap ring is securely seated in the groove of the countershaft bearing.

Dimension A as installed: 4.6–8.3 mm (0.181–0.327 in)



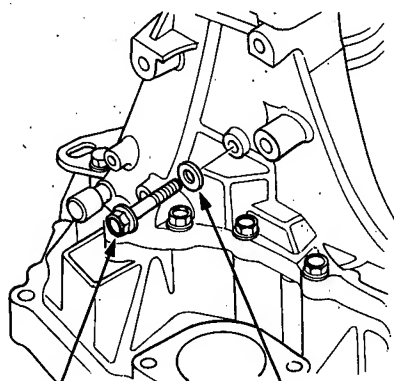
22. Tighten the transmission housing attaching bolts in a criss-cross pattern in several steps as shown.

8 x 1.25 mm  
28 N·m (2.8 kg-m, 20 lb-ft)





23. Tighten the reverse idler gear shaft bolt.

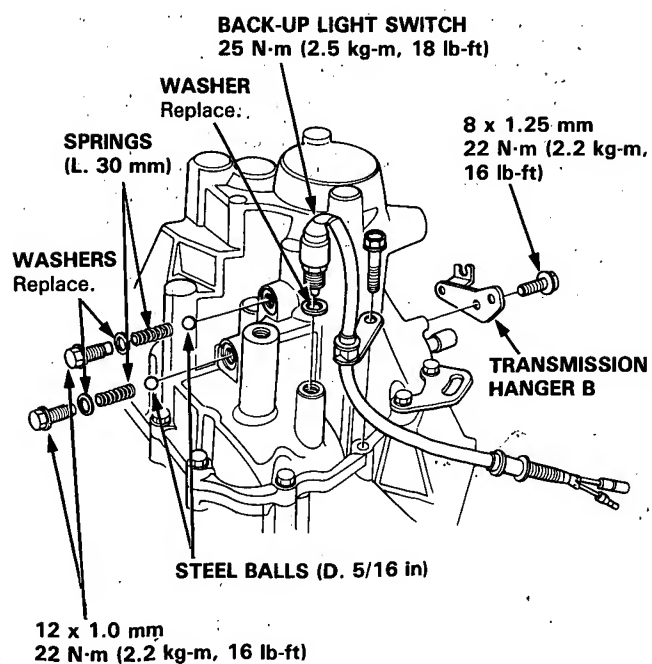


**REVERSE IDLER GEAR  
SHAFT BOLT**  
10 x 1.25 mm  
55 N·m (5.5 kg-m, 40 lb-ft)

**WASHER**  
Replace.

24. Install the steel balls, springs, and set bolts.

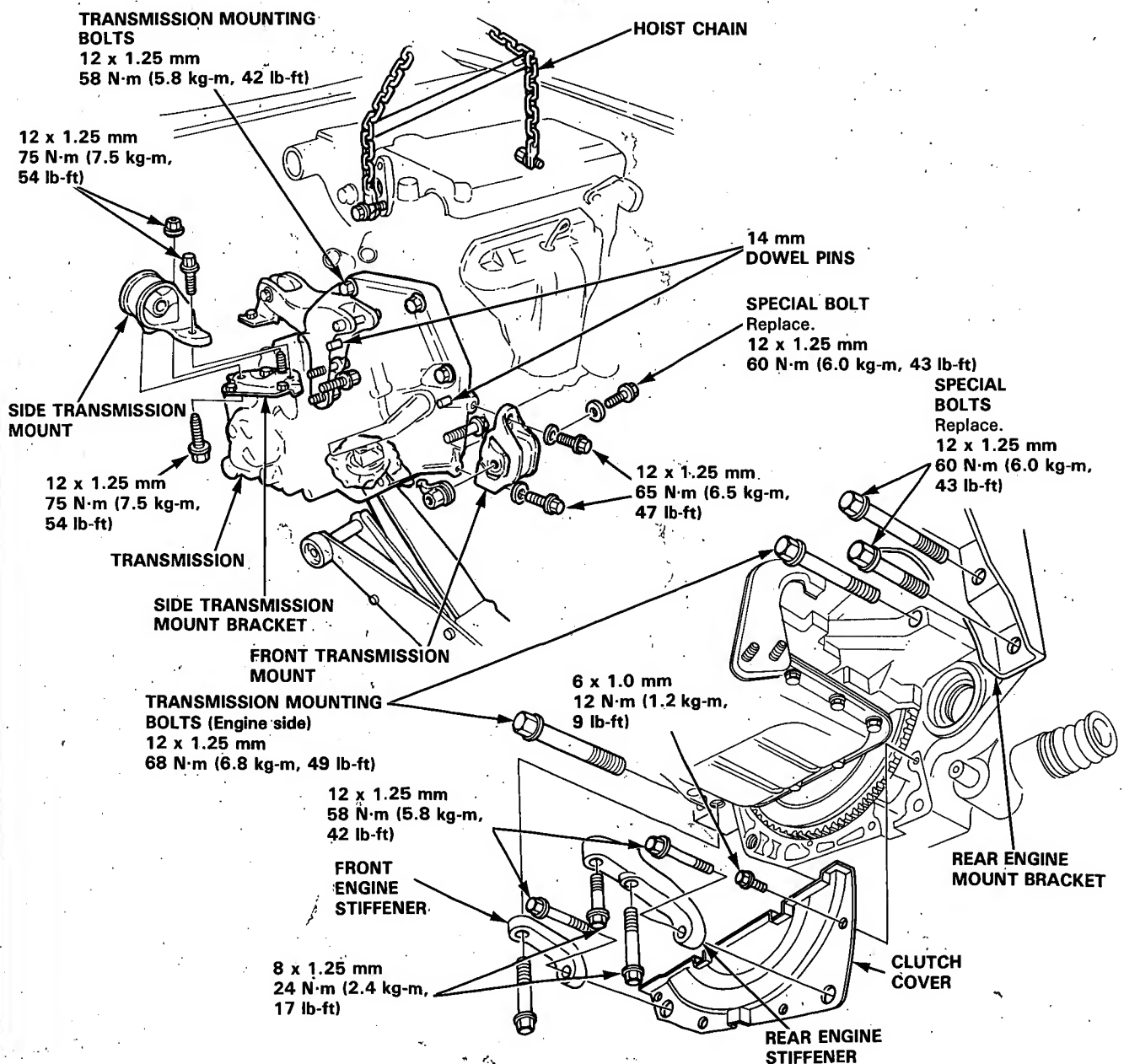
25. Install the back-up light switch and transmission hanger B.

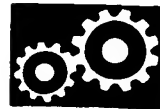


# Transmission Assembly

## Installation

1. Place the transmission on the transmission jack, then raise it to engine level.
2. Check that the two 14 mm dowel pins are installed in the clutch housing.
3. Install the three upper transmission mounting bolts.
4. Install the two transmission mounting bolts (engine side).
5. Install the two rear engine mount bracket special bolts.
6. Install the side transmission mount bolts and nut.
7. Install the front transmission mount.
8. Install the clutch cover.
9. Install the front engine stiffener.
10. Install the rear engine stiffener.
11. Remove the hoist chain by removing the bolts.





12. Install the change extension and change rod.

**NOTE:**

- Install the clip on the change rod as shown.
- Turn the boot so the hole is facing down.
- Make sure the boot is installed on the change rod.

13. Install the intermediate shaft (see section 16).

14. Install the left driveshaft, then install the left ball joint to the lower arm (see section 16).

15. Install the right driveshaft (see section 16).

16. Install the right radius rod.

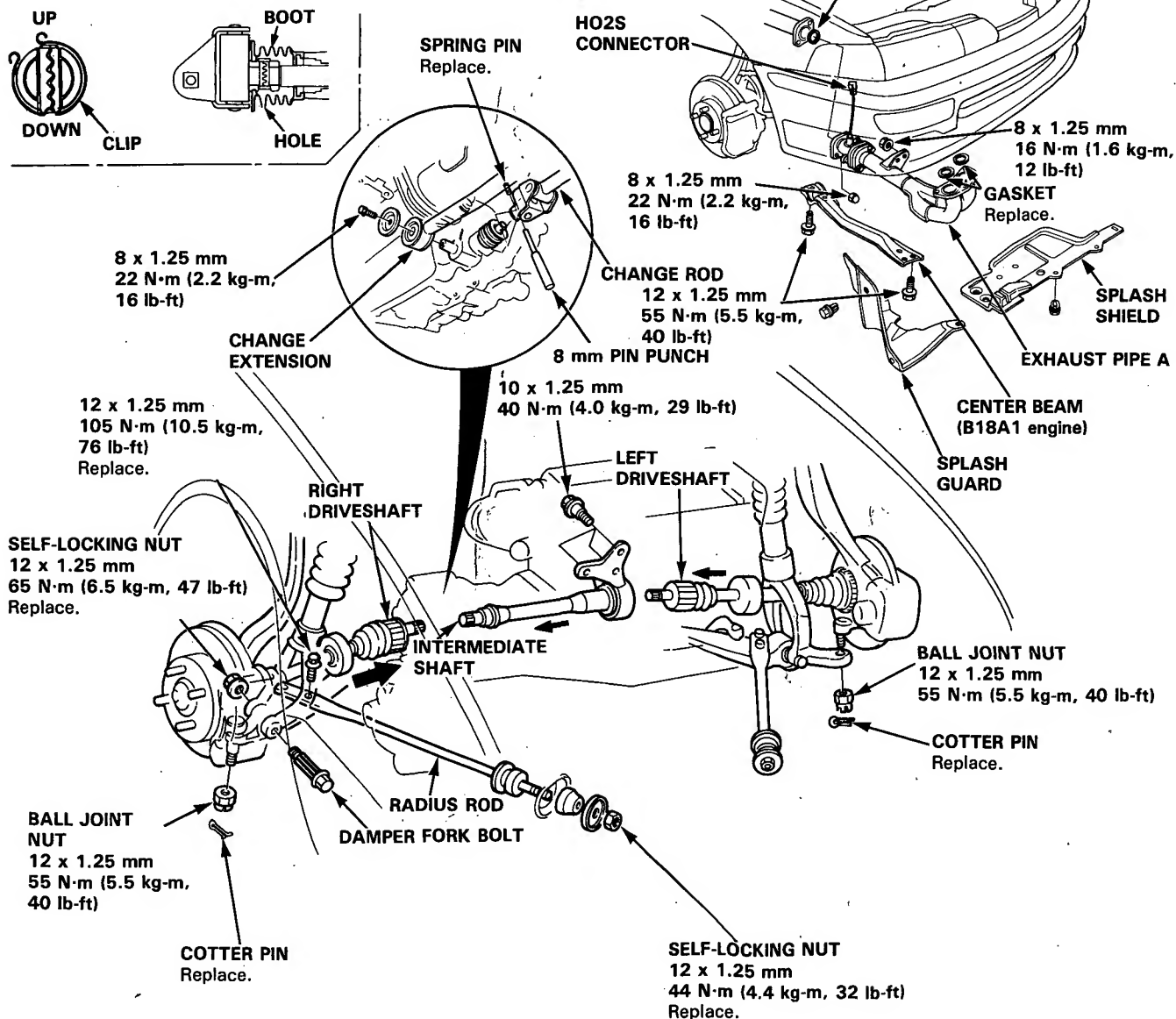
17. Install the right damper fork bolt.

18. Install the right ball joint to the lower arm.

19. Install the exhaust pipe A, then connect the connector of the heated oxygen sensor (HO2S).

20. Install the center beam (B18A1 engine).

21. Install the right front splash guard and splash shield.



(cont'd)

# Transmission Assembly

## Installation (cont'd)

22. Install the starter motor, then connect the starter motor cables and wire harness clamp.

NOTE: When installing the starter cable, make sure that the crimped side of the ring terminal is facing out (see section 23).

23. Install the distributor and connect the distributor connectors.
24. Install the power steering speed sensor.
25. Connect the back-up light switch connectors.
26. Connect the clutch cable to the clutch cable bracket, then connect to the release arm.

27. Connect the transmission ground cable.

28. Install the air cleaner assembly with the intake air duct (see section 11).

29. Install the battery base.

30. Refill the transmission with oil (see page 13-3).

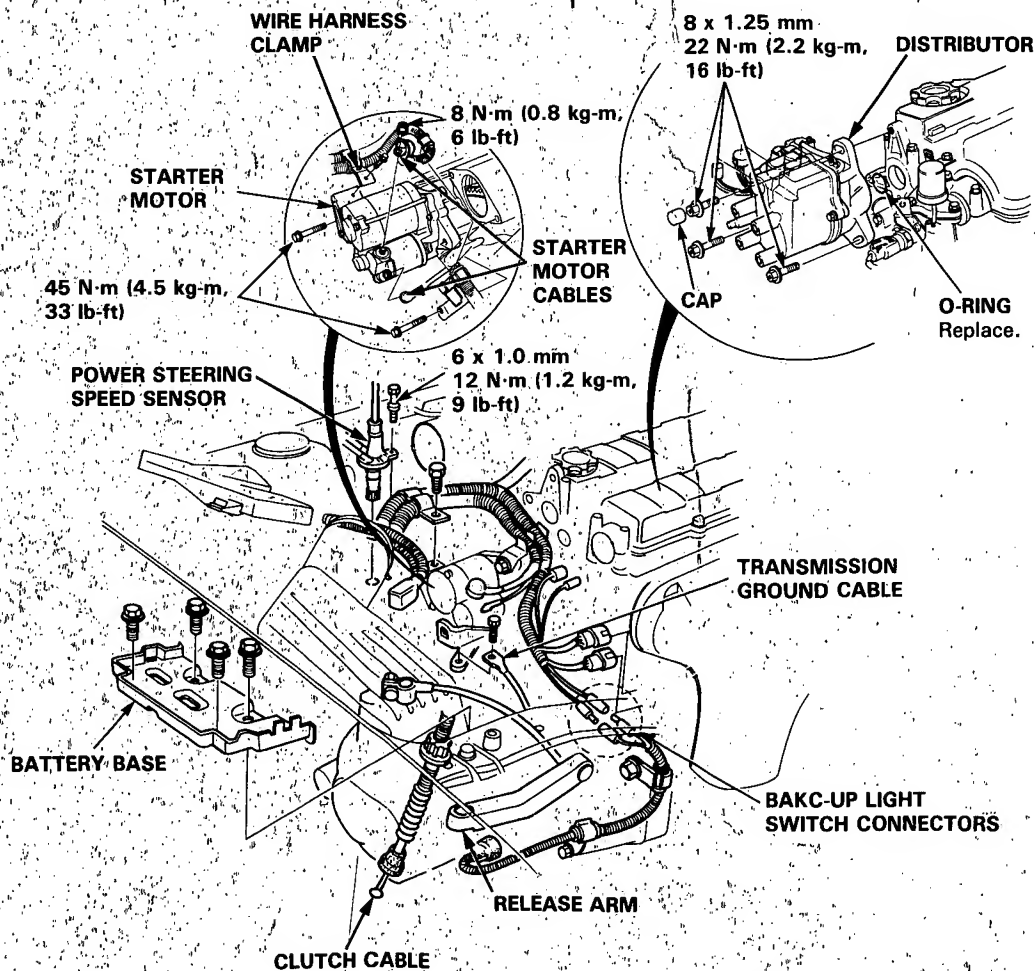
31. Install the battery, then connect the battery positive (+) and negative (-) cables to the battery.

32. Adjust the clutch free play (see section 12).

33. Check the ignition timing (see section 23).

34. Check the transmission for smooth operation.

35. Check the front wheel alignment (see section 18).





# Automatic Transmission

Special Tools .....	14-2
Description .....	14-3

## Electrical System

Circuit Diagram .....	14-30
Component Location.....	14-32
Troubleshooting Procedures .....	14-33
Electrical Troubleshooting	
Symptom-to-Component	
Chart .....	14-34
Troubleshooting Flowcharts .....	14-36
A/T Speed Pulser .....	14-55
Lock-up Control Solenoid	
Valve A/B .....	14-56
Shift Control Solenoid	
Valve A/B .....	14-57
S <sub>4</sub> Switch .....	14-58

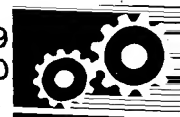
## Hydraulic System

Hydraulic System	
Symptom-to-Component Chart..	14-60
Road Test .....	14-64
Stall Speed .....	14-66
Fluid Level .....	14-67
Pressure Testing .....	14-68

## Transmission

Removal .....	14-74
Illustrated Index	
Right Side Cover .....	14-80
Transmission Housing .....	14-82
Torque Converter Housing .....	14-84
Right Side Cover	
Removal .....	14-86
Transmission Housing	
Removal .....	14-87
Mainshaft/Countershaft/Secondary Shaft	
Removal .....	14-88
Valve Body	
Removal .....	14-89
Repair .....	14-90
Valve Caps .....	14-91
Valve	
Assembly .....	14-92

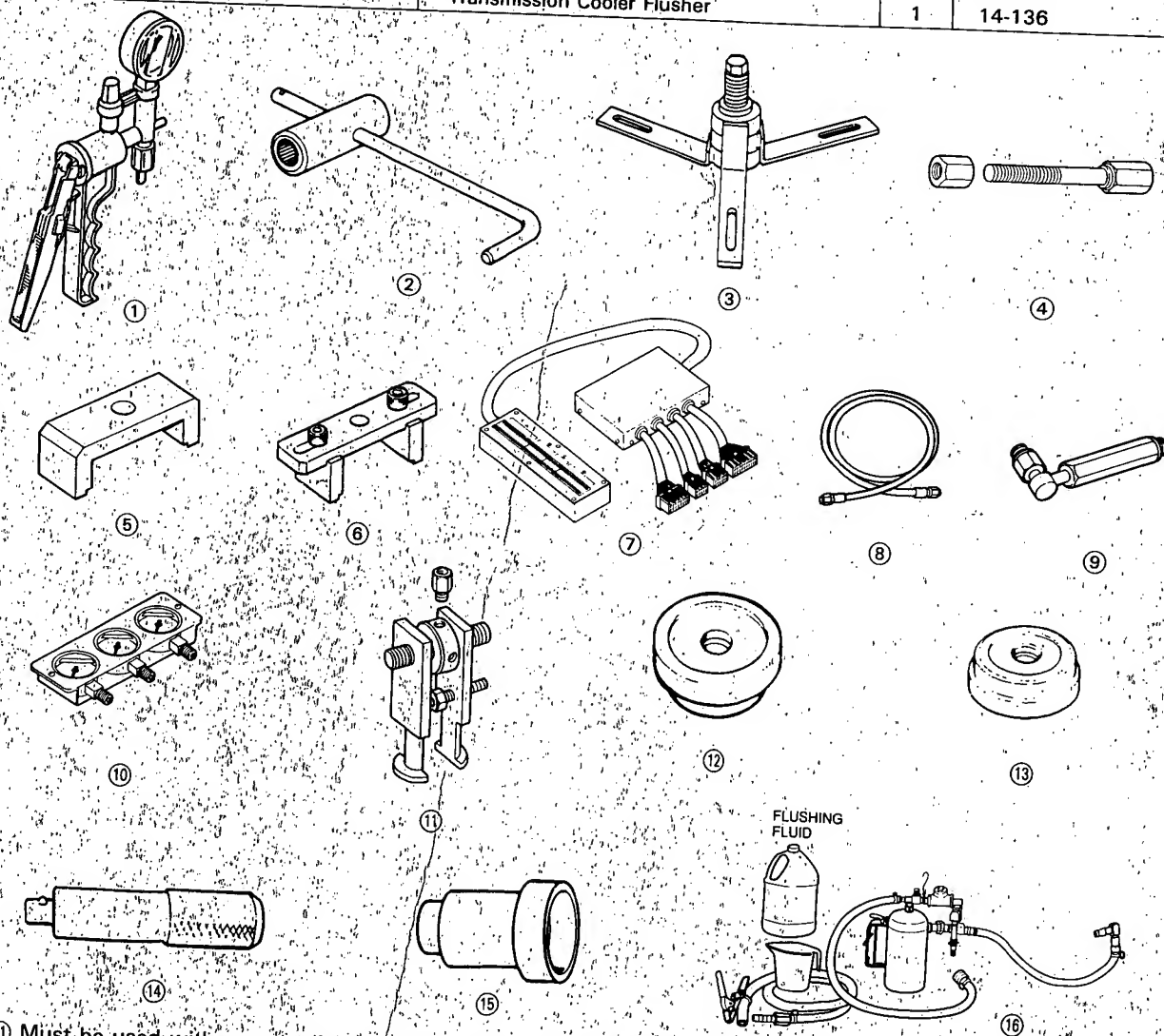
Main Valve Body .....	14-94
Oil Pump .....	14-96
Regulator Valve Body .....	14-97
Secondary Valve Body .....	14-98
Servo Valve Body .....	14-100
2nd Accumulator Body .....	14-101
Mainshaft .....	14-102
Countershaft.....	14-103
One-way Clutch/Parking Gear .....	14-107
Secondary Shaft .....	14-108
Clutch	
Illustrated Index .....	14-111
Disassembly .....	14-113
Reassembly .....	14-115
Torque Converter Housing Bearings	
Mainshaft Bearing/Oil Seal .....	14-119
Countershaft Bearing .....	14-120
Secondary Shaft Bearing.....	14-120
Transmission Housing Bearings .....	14-121
Reverse Idler Gear .....	14-122
Transmission	
Reassembly .....	14-123
Parking Brake Stopper .....	14-128
Right Side Cover	
Reassembly .....	14-129
Torque Converter .....	14-130
Transmission	
Installation .....	14-131
Cooler Flushing .....	14-136
Gearshift Selector .....	14-138
Shift Cable	
Adjustment .....	14-139
Removal/Installation .....	14-140
Vacuum Modulator Assembly .....	14-141



NOTE: The radio may have a coded theft protection circuit. Be sure to get the code number before disconnecting the battery.  
 Removing the No. 14 (15 A) fuse.  
 Removing the radio.  
 Connecting power and turning the radio ON, the word "CODE" will be displayed. Then enter the code.

# Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	A973X-041-XXXXX	Vacuum Pump/Gauge	1	14-68, 69, 70, 71, 72, 141, 142
②	07GAB-PF50100 or 07GAB-PF50101	Mainshaft Holder	1	14-86, 127
③	07HAC-PK4010A	Housing Puller	1	14-87
④	07GAE-PG40200	Clutch Spring Compressor Bolt Assembly	1	14-113, 116
⑤	07HAE-PL50100	Clutch Spring Compressor Attachment	1	14-113, 116
⑥	07LAE-PX40100	Clutch Spring Compressor Attachment	1	14-113, 116
⑦	07LAJ-PT3010A	Test Harness	1	14-64
⑧	07MAJ-PY4011A	A/T Oil Pressure Hose, 2210 mm	1	14-68
⑨	07MAJ-PY40120	A/T Oil Pressure Hose Adapter	1	14-68
⑩	07406-0020400	A/T Oil Pressure Gauge Set W/Panel	1	14-68
⑪	07736-A01000A	Adjustable Bearing Puller, 25-40 mm	1	14-120
⑫	07746-0010500	Attachment, 62 x 68 mm	1	14-119, 120
⑬	07746-0010600	Attachment, 72 x 75 mm	1	14-119
⑭	07749-0010000	Driver	1	14-119, 120
⑮	07947-6340500	Attachment	1	14-119
⑯	J38405-A	Transmission Cooler Flusher	1	14-136



⑪ Must be used with commercially available 3/8 in. x 16 threads/in. slide hammer.

# Description



The Automatic Transmission is a combination of a 3-element torque converter and a triple-shaft electronically controlled automatic transmission which provides 4 speeds forward and 1 speed reverse. The entire unit is positioned in line with the engine.

## TORQUE CONVERTER, GEARS AND CLUTCHES

The torque converter consists of a pump, turbine and stator, assembled in a single unit.

They are connected to the engine crankshaft so they turn together as a unit as the engine turns. Around the outside of the torque converter is a ring gear which meshes with the starter pinion when the engine is being started. The entire torque converter assembly serves as a flywheel while transmitting power to the transmission mainshaft.

The transmission has three parallel shafts, the mainshaft, the countershaft and the secondary shaft. The mainshaft is in line with the engine crankshaft.

The mainshaft includes the clutches for 1st, and 4th, and gears for 3rd, 4th, Reverse and 1st (3rd gear is integral with the mainshaft, while reverse gear is integral with 4th gear).

The countershaft includes 3rd clutch and gears for 2nd, 3rd, 4th, Reverse and 1st.

The secondary shaft includes 2nd clutch, the secondary drive gear, and 2nd gear.

The 4th and reverse gears can be locked to the countershaft at its center, providing 4th gear or Reverse, depending on which way the selector is moved.

The gears on the mainshaft are in constant mesh with those on the countershaft. When certain combinations of gears in the transmission are engaged by the clutches, power is transmitted from the mainshaft to the countershaft to provide **S<sub>3</sub>**, **S<sub>4</sub>**, **D**, **2** and **R**.

## ELECTRONIC CONTROL

The electronic control system consists of the Transmission Control Module (TCM), sensors, and 4 solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions.

The TCM is located below the dash to the left of the steering column.

## HYDRAULIC CONTROL

The valve bodies include the main valve body, secondary valve body, servo valve body, regulator valve body, and 2nd accumulator body.

They are bolted to the torque converter housing as an assembly.

The main valve body contains the manual valve, 1-2 shift valve, 2-3 shift valve, 3-4 shift valve, cooler check valve, orifice control valve, lock-up shift valve, lock-up control valve, 3-2 kick-down valve, relief valve and the oil pump.

The secondary valve body includes the 4th exhaust valve, 3rd kick-down valve, modulator valve, servo control valve and the 2nd orifice control valve.

The servo valve body contains the accumulator pistons and servo valve. The regulator valve body contains pressure regulator valve, torque converter check valve, and lock-up timing valve. Fluid from the regulator passes through the manual valve to the various control valves.

The 1st, 3rd and 4th clutches receive oil from their respective feed pipes.

## SHIFT CONTROL MECHANISM

Input from various sensors located throughout the car determines which shift control solenoid valve the TCM will activate. Activating a shift control solenoid valve changes modulator pressure, causing a shift valve to move. This pressurizes a line to one of the clutches, engaging that clutch and its corresponding gear.

## LOCK-UP MECHANISM

In **S<sub>4</sub>** or **D**, in 2nd, 3rd, and 4th, and **S<sub>3</sub>** in 3rd during deceleration, pressurized fluid is drained from the back of the torque converter through an oil passage, causing the lock-up piston to be held against the torque converter cover. As this takes place, the mainshaft rotates at the same speed as the engine crankshaft. Together with hydraulic control, the TCM optimizes the timing of the lock-up mechanism.

The lock-up valves control the range of lock-up according to lock-up control solenoid valves A and B, and vacuum modulator valve (throttle valve B). When lock-up control solenoid valves A and B activate, modulator pressure changes. Lock-up control solenoid valves A and B are mounted on the torque converter housing, and are controlled by the TCM.

(cont'd)

## Description

(cont'd)

### GEAR SELECTION

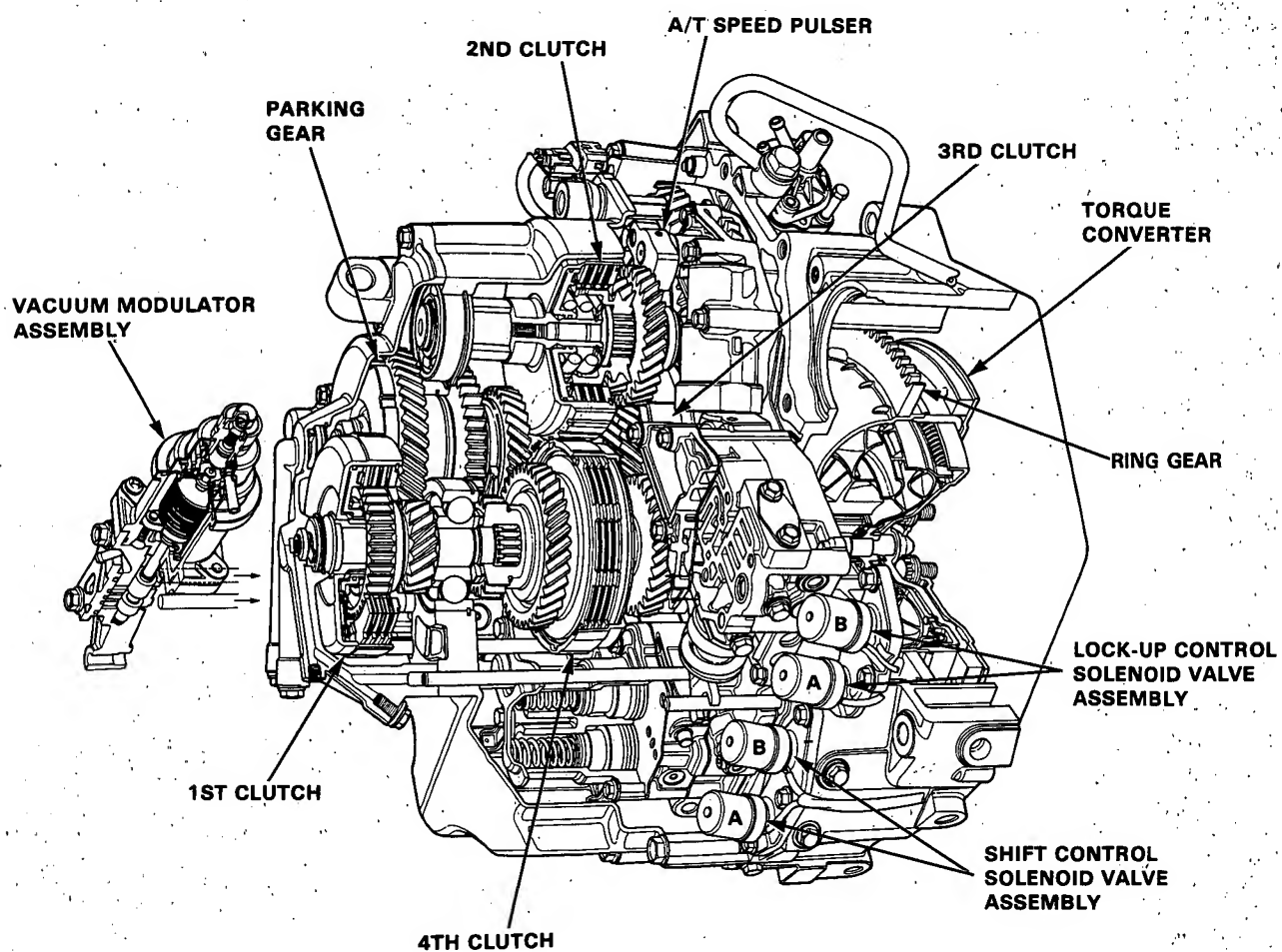
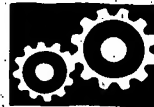
The selector lever has six positions: **P** PARK, **R** REVERSE, **N** NEUTRAL, **D**, **S** SPORTS and **2** SECOND.

Position	Description
<b>P</b> PARK	Front wheels locked; parking pawl engaged with parking gear on countershaft. All clutches released.
<b>R</b> REVERSE	Reverse; reverse selector engaged with countershaft reverse gear and 4th gear clutch locked.
<b>N</b> NEUTRAL	All clutches released.
<b>D</b> DRIVE	General driving; starts off in 1st, shifts automatically to 2nd, 3rd, then 4th, depending on vehicle speed and throttle position. Downshifts through 3rd, 2nd and 1st on deceleration to stop. The lock-up mechanism comes into operation in 2nd, 3rd and 4th when the transmission is in <b>D</b> and <b>S4</b> .
<b>S</b> SPORTS (1st through 3rd or 4th)	For rapid acceleration at highway speeds and general driving; starts off in 1st, shifts automatically to 2nd, then 3rd ( <b>S3</b> ), and then 4th ( <b>S4</b> ) depending on vehicle speed and throttle position. Downshifts through lower gears on deceleration to stop. When the transmission is in <b>S3</b> , the lock-up mechanism comes into operation in 3rd speed during deceleration.
<b>2</b> SECOND	For engine braking or better traction starting off on loose or slippery surfaces; stays in 2nd gear, does not shift up or down.

Starting is possible only in **P** and **N** through use of a slide-type, neutral-safety switch.

### AUTOMATIC TRANSAXLE (A/T) GEAR POSITION INDICATOR

A/T gear position indicator in the instrument panel shows what gear has been selected without having to look down at the console.



# Description

## Clutches

### [1st Clutch]

The 1st clutch is on the right end of the mainshaft. In the **S3**, **S4**, or **D** range, constant hydraulic pressure is applied to the mainshaft through the 1st clutch to the mainshaft 1st gear.

The clutch plate is mounted on the clutch drum, while the clutch disc is fitted to the mainshaft 1st gear.

The 1st gears are attached to the mainshaft and countershaft through needle bearings, one for each gear.

When select lever is placed in the **S3**, **S4**, or **D** range, hydraulic pressure is applied from the right side cover through the mainshaft, and thus to the clutch drum; as the pressure rises, the clutch piston presses the clutch plate and clutch disc, thus causing the clutch to engage.

Power is transmitted from the mainshaft 1st gear, through the countershaft 1st gear, to the one-way clutch, parking gear, and finally to the countershaft. The one-way clutch locks in the forward direction when in 1st gear. In the **S3**, **S4**, or **D** range, all others besides 1st gear are not engaged, thus transmitting no power.

### [2nd Clutch]

The 2nd clutch is on the secondary shaft, and is the same construction as the 1st clutch. The secondary shaft 2nd drive gear uses a needle bearing. The countershaft 2nd gear is splined to the countershaft.

In 2nd gear of **2**, **S3**, **S4**, or **D**, hydraulic pressure is applied to the clutch drum from the secondary shaft, thus transmitting power from the mainshaft 3rd gear, countershaft 3rd gear, secondary shaft 2nd gear, 2nd drive gear to the countershaft 2nd gear.

### [3rd Clutch]

The 3rd clutch is on the left end of the countershaft.

The clutch hub is joined to the countershaft 3rd gear, on the countershaft, supported by a single needle bearing.

In 3rd gear of **S3**, **S4**, or **D**, hydraulic pressure is applied to the 3rd clutch on the countershaft, thus causing the clutch to engage, and transmitting power.

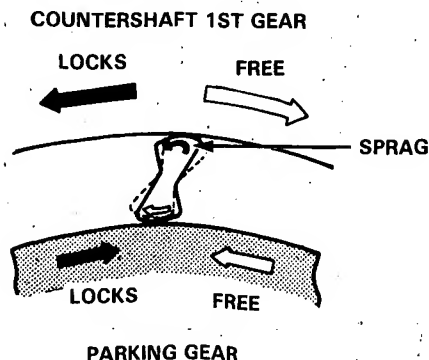
### [4th Clutch]

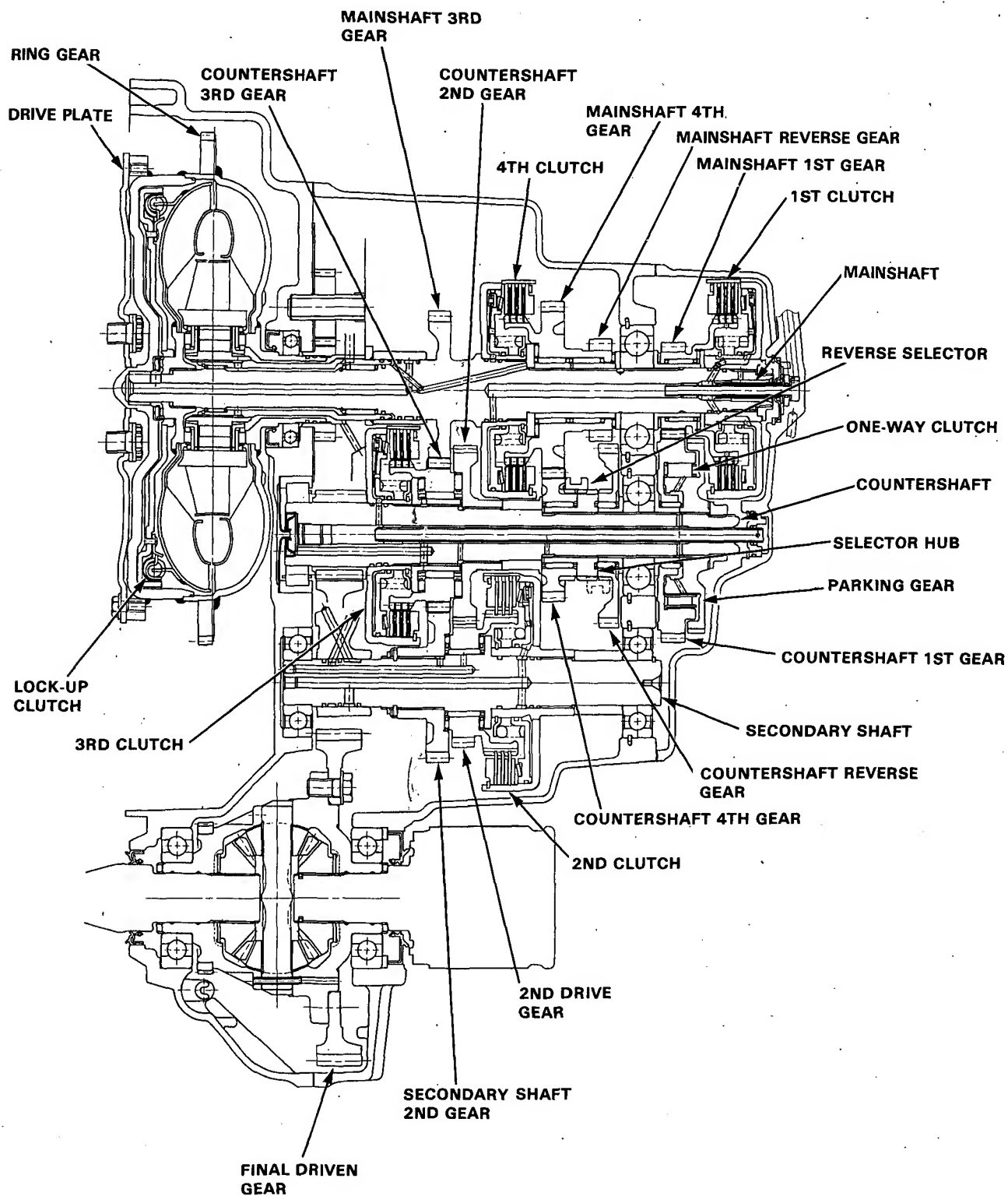
The 4th clutch is on the center of the mainshaft. The clutch hub is joined to the mainshaft 4th gear and reverse gear, supported by two needle bearings.

In 4th gear of **S4**, or **D**, hydraulic pressure is generated within the mainshaft, applying pressure to the 4th clutch on the mainshaft.

### [One-way Clutch]

A one-way clutch disengages 1st gear when in 2nd, 3rd and 4th gear ranges. The clutch is splined on the countershaft between 1st gear and the parking gear, with sprag elements and the retainer which supports the central section between the sprags, when countershaft 1st gear rotates clockwise and parking gear counterclockwise, the sprags incline to the right, locking the gears together. When shifting from 1st to 2nd in the **S3**, **S4** or **D** range, the higher ratio of 2nd gear causes the countershaft to rotate clockwise at a speed greater than that of 1st gear. The parking gear then rotates clockwise, and the sprags move away from their locking position. In **S3**, **S4**, or **D** the higher ratio of 3rd gear prevents the sprags from locking, keeping 1st gear disengaged.





# Description

## Clutches (cont'd)

### Lock-up Clutch

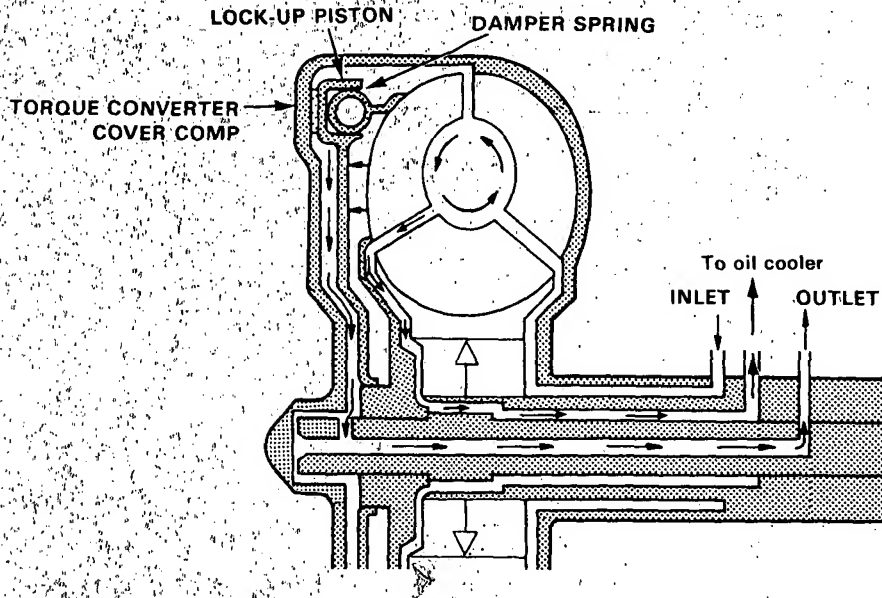
#### 1. Operation (clutch on)

With the lock-up clutch on, the oil in the chamber between the converter cover and lock-up piston is discharged, and the converter oil exerts pressure through the piston against the converter cover. As a result, the converter turbine is locked on the converter cover firmly. The effect is to bypass the converter, thereby placing the car in direct drive.

#### Power flow

The power flows by way of:

Engine  
↓  
Drive plate  
↓  
Torque converter cover  
↓  
Lock-up piston  
↓  
Damper spring  
↓  
Turbine  
↓  
Mainshaft

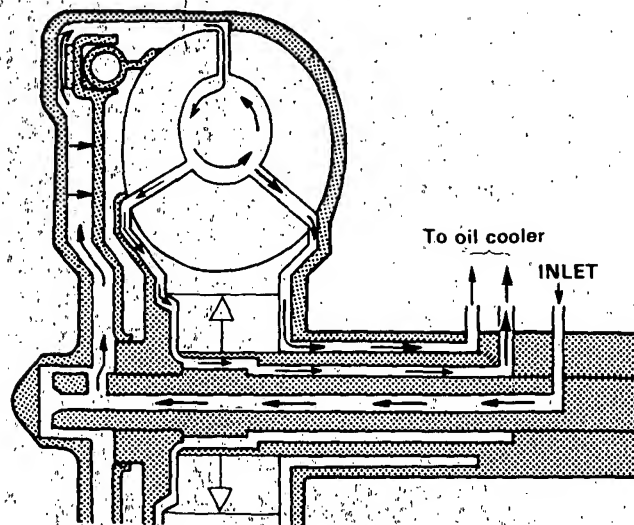


#### 2. Operation (clutch off)

With the lock-up clutch off, the oil flows in the reverse of CLUTCH ON. As a result, the lock-up piston is moved away from the converter cover; that is, the torque converter lock-up is released.

#### Power flow

Engine  
↓  
Drive plate  
↓  
Torque converter cover  
↓  
Pump  
↓  
Turbine  
↓  
Mainshaft



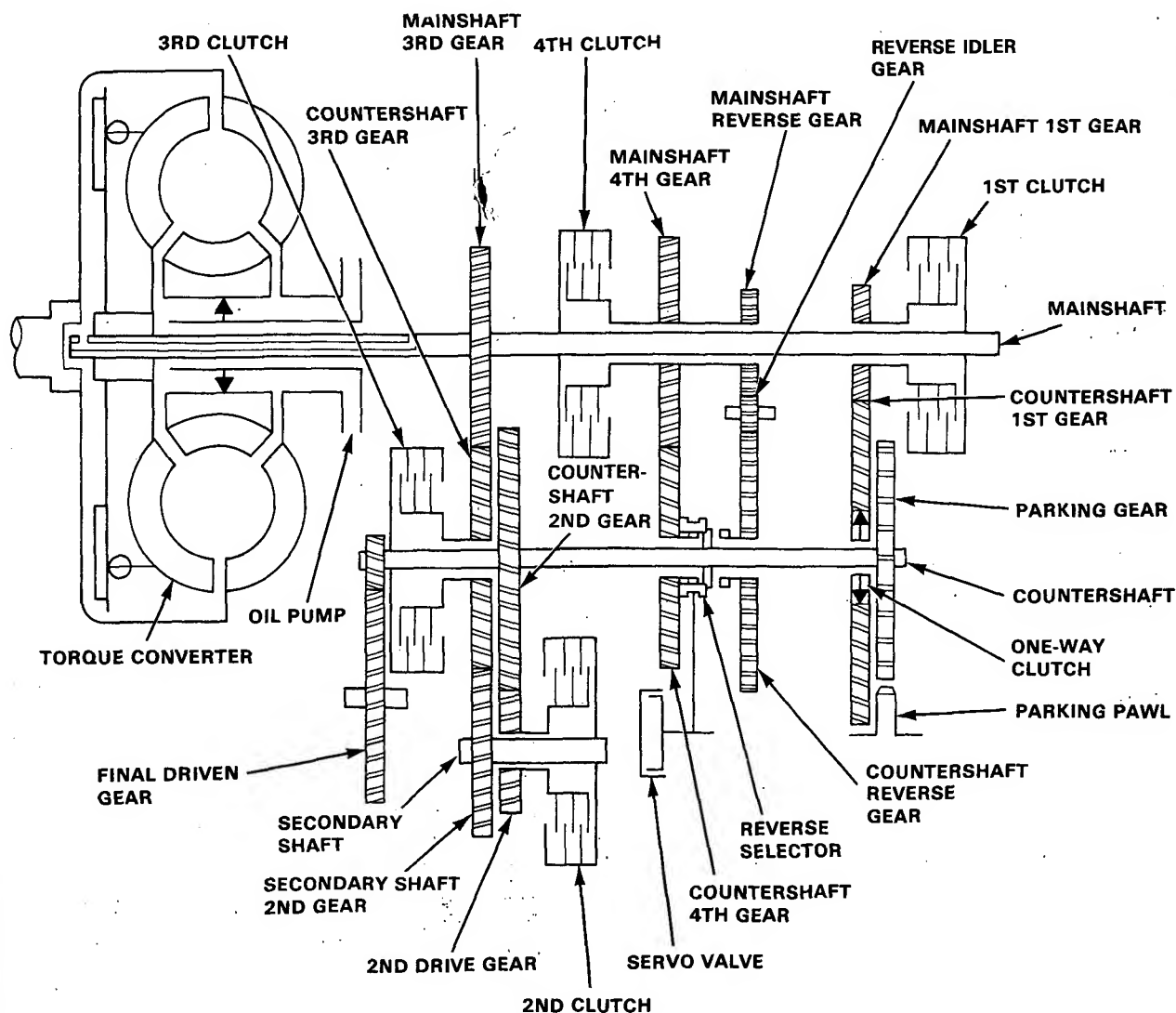




## Power Flow

PART POSITION		TORQUE CONVERTER	1ST GEAR 1ST CLUTCH	1ST GEAR ONE-WAY CLUTCH	2ND GEAR 2ND CLUTCH	3RD GEAR 3RD CLUTCH	4TH		REVERSE GEAR	PARKING GEAR
							GEAR	CLUTCH		
P		O	X	X	X	X	X	X	X	O
R		O	X	X	X	X	X	O	O	X
N		O	X	X	X	X	X	X	X	X
S <sub>3</sub>	1ST	O	O	O	X	X	X	X	X	X
	2ND	O	*O	X	O	X	X	X	X	X
	3RD	O	*O	X	X	O	X	X	X	X
S <sub>4</sub> or D	1ST	O	O	O	X	X	X	X	X	X
	2ND	O	*O	X	O	X	X	X	X	X
	3RD	O	*O	X	X	O	X	X	X	X
	4TH	O	*O	X	X	X	O	O	X	X
2	2ND	O	*O	X	O	X	X	X	X	X

O: Operates, X: Doesn't operate, \*: Although the 1st clutch engages, driving power is not transmitted as the one-way clutch slips.



# Description

## Electronic Control System

### Electronic Control System

The electronic control system consists of the Transmission Control Module (TCM), sensors, and 4 solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions.

The TCM is below the dash to the left of the steering column.

### Shift Control

Getting a signal from each sensor, the TCM detects the appropriate gear shifting and activates shift control solenoid valves A and/or B.

The combination of driving signals to shift control solenoid valves A and B is shown in the table below.

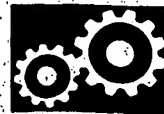
Shift control solenoid valve Position (gear)	A	B
D S <sub>3</sub> S <sub>4</sub> (1st)	OFF	ON
D S <sub>3</sub> S <sub>4</sub> 2 (2nd)	ON	ON
D S <sub>3</sub> S <sub>4</sub> (3rd)	ON	OFF
D S <sub>4</sub> (4th)	OFF	OFF
R	ON	OFF

### Lock-up Control

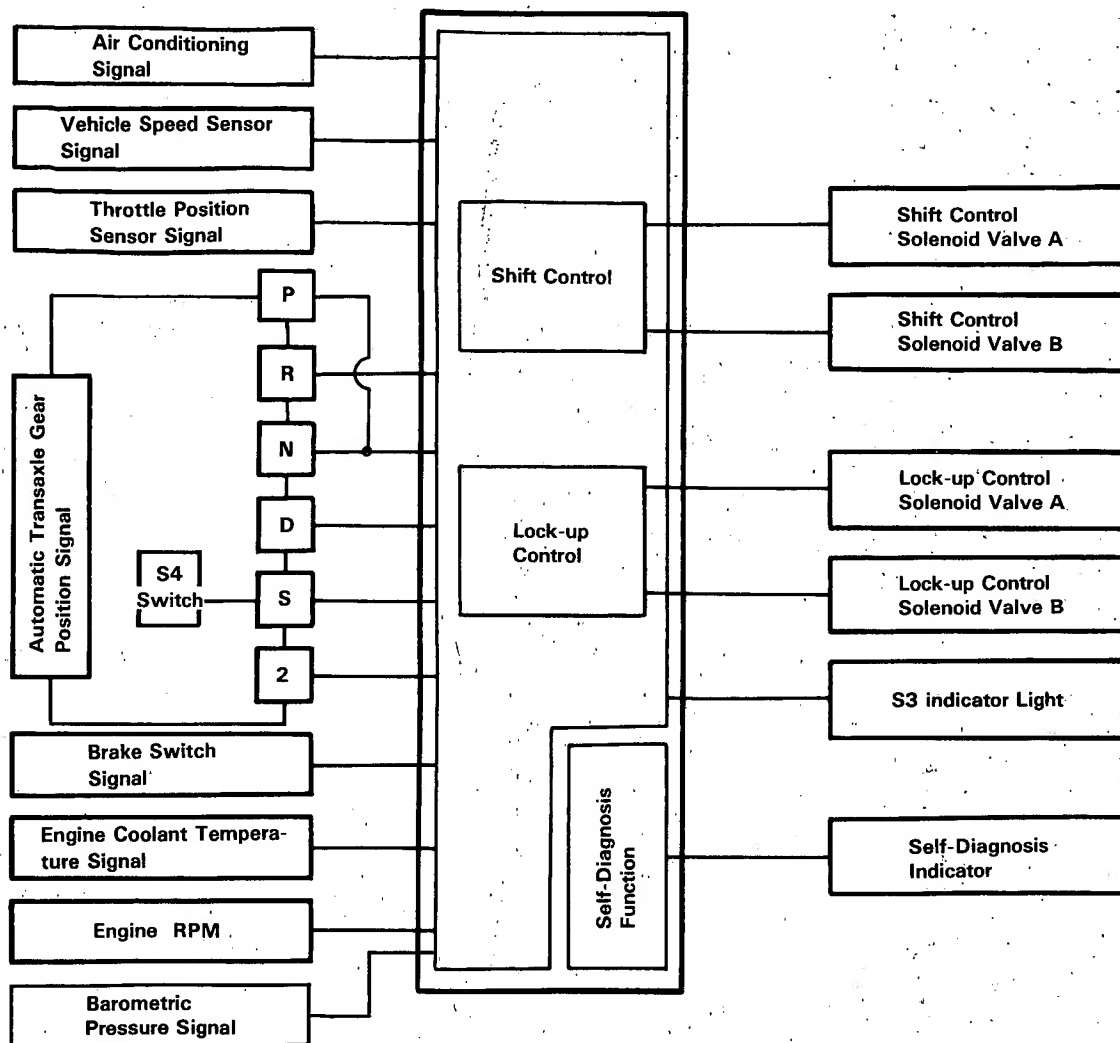
From sensor input signals, the TCM detects whether to turn the lock-up ON or OFF and activates lock-up control solenoid valve A and/or B accordingly.

The combination of driving signals to lock-up control solenoid valves A and B is shown in the table below.

Solenoid valve Lock-up condition	A	B
Lock-up OFF	OFF	OFF
Lock-up, slight	ON	OFF
Lock-up, half	ON	ON
Lock-up, full	ON	ON
Lock-up during deceleration	ON	Duty operation OFF ← → ON



# TRANSMISSION CONTROL MODULE (TCM)

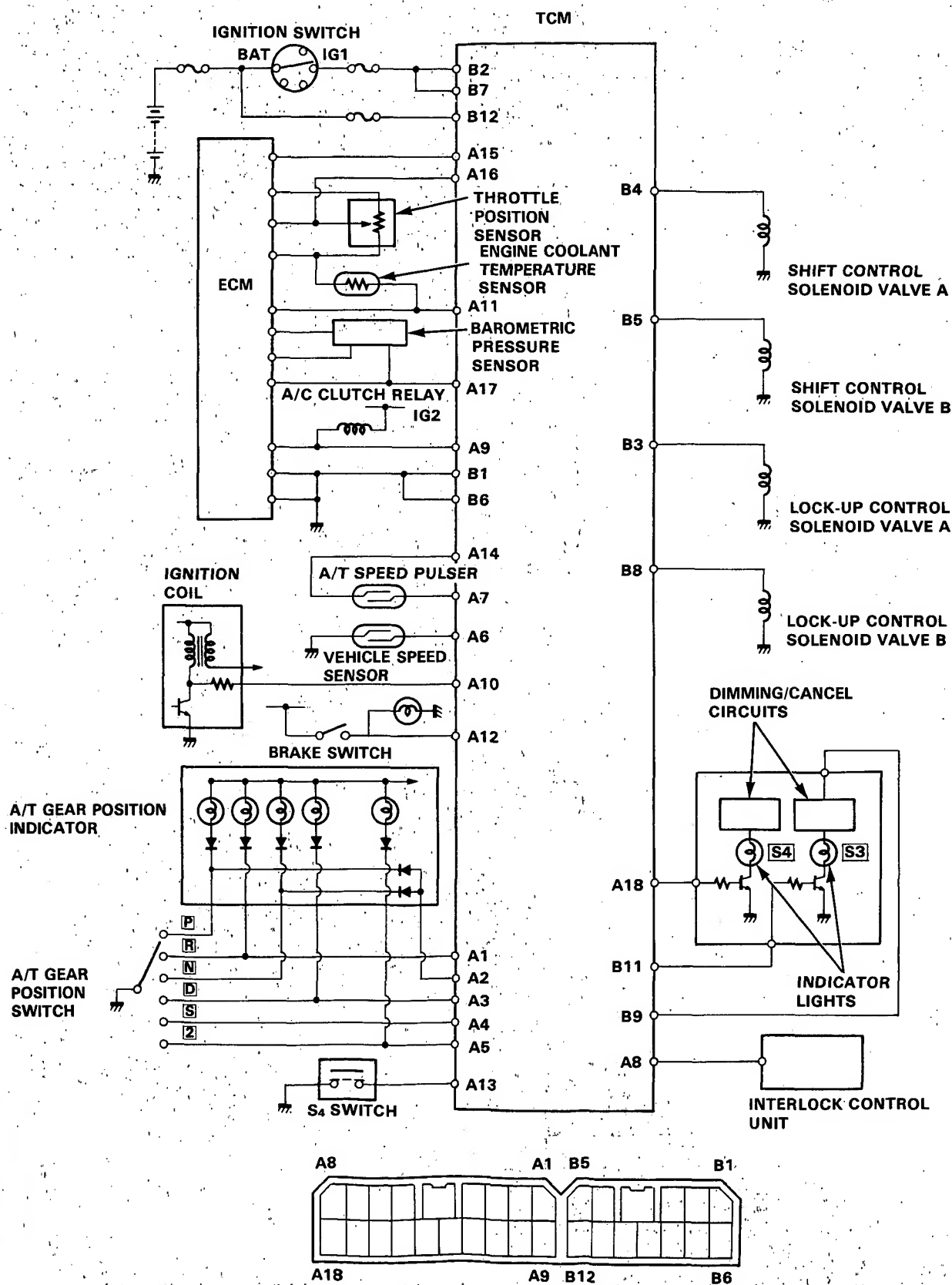


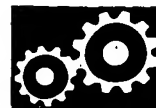
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# Description

## Electronic Control System (cont'd)

Circuit Diagram and Terminal Location



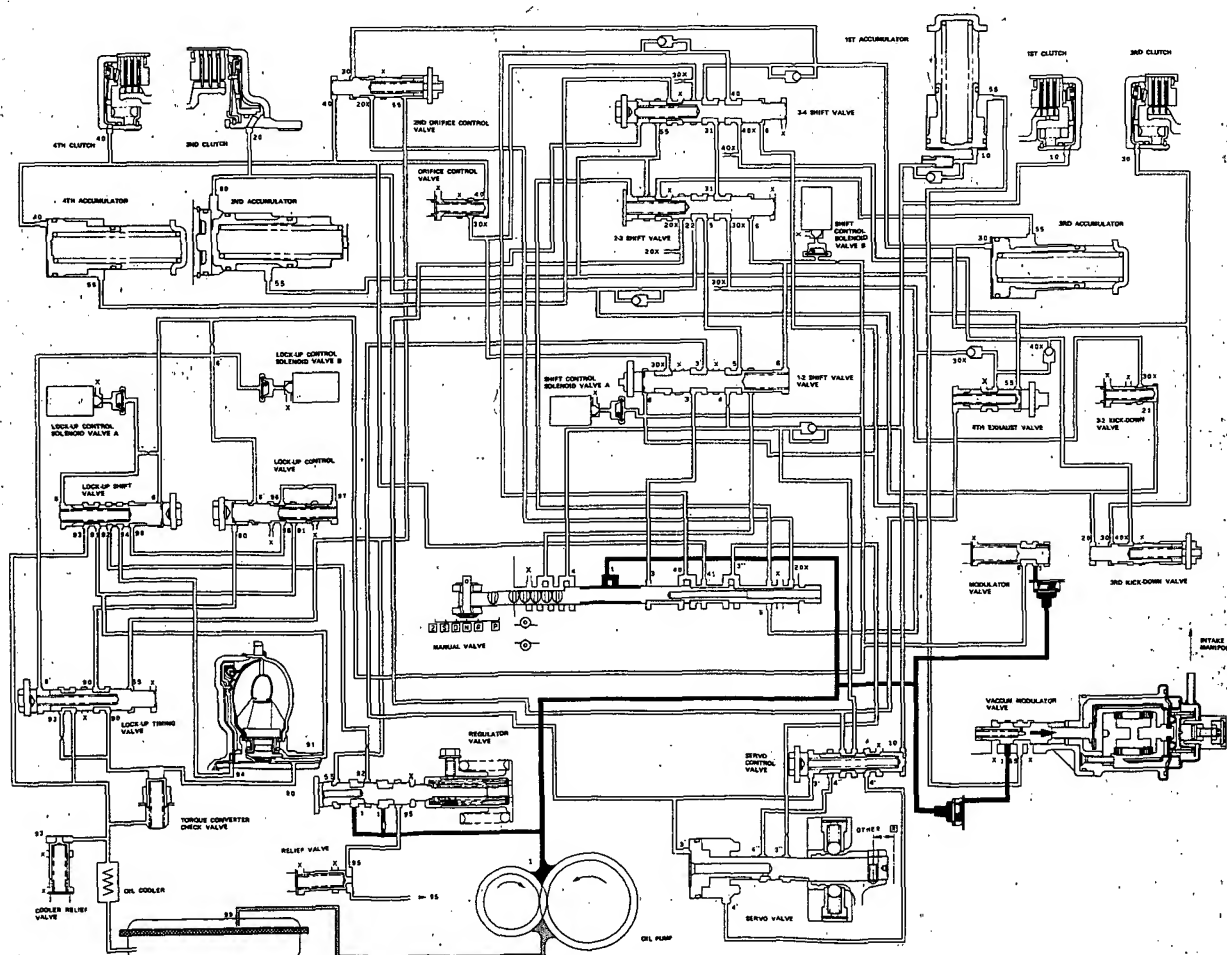


## Hydraulic Flow

NO.	DESCRIPTION OF PRESSURE	NO.	DESCRIPTION OF PRESSURE	NO.	DESCRIPTION OF PRESSURE	NO.	DESCRIPTION OF PRESSURE
1	LINE	6	MODULATOR	30	3RD CLUTCH	93	OIL COOLER
3	LINE	6'	MODULATOR (Duty Control)	31	3RD CLUTCH	94	TORQUE CONVERTER
3'	LINE	10	1ST CLUTCH	40	4TH CLUTCH	95	LUBRICATION
3''	LINE	20	2ND CLUTCH	41	4TH CLUTCH	96	TORQUE CONVERTER
4	LINE	21	2ND CLUTCH	55	THROTTLE B (VACUUM MODULATOR)	99	SUCTION
4'	LINE	22	2ND CLUTCH	90	TORQUE CONVERTER	X	BLEED
4''	LINE	25	2ND MODULATOR	91	TORQUE CONVERTER		
5	LINE	25'	2ND MODULATOR	92	TORQUE CONVERTER		

### **N** Position

As the engine turns, the oil pump also starts to operate. Automatic Transmission Fluid (ATF) is drawn from (99) and discharged into (1). Then, ATF pressure is controlled by the regulator valve and becomes the line pressure (1). The torque converter inlet pressure (92) enters (94) of the torque converter through the orifice and discharges into (90). The torque converter check valve prevents the torque converter pressure from rising. Under this condition, the hydraulic pressure is not applied to the clutches as the manual valve stops line pressure (1).



(cont'd)

# Description

## Hydraulic Flow (cont'd)

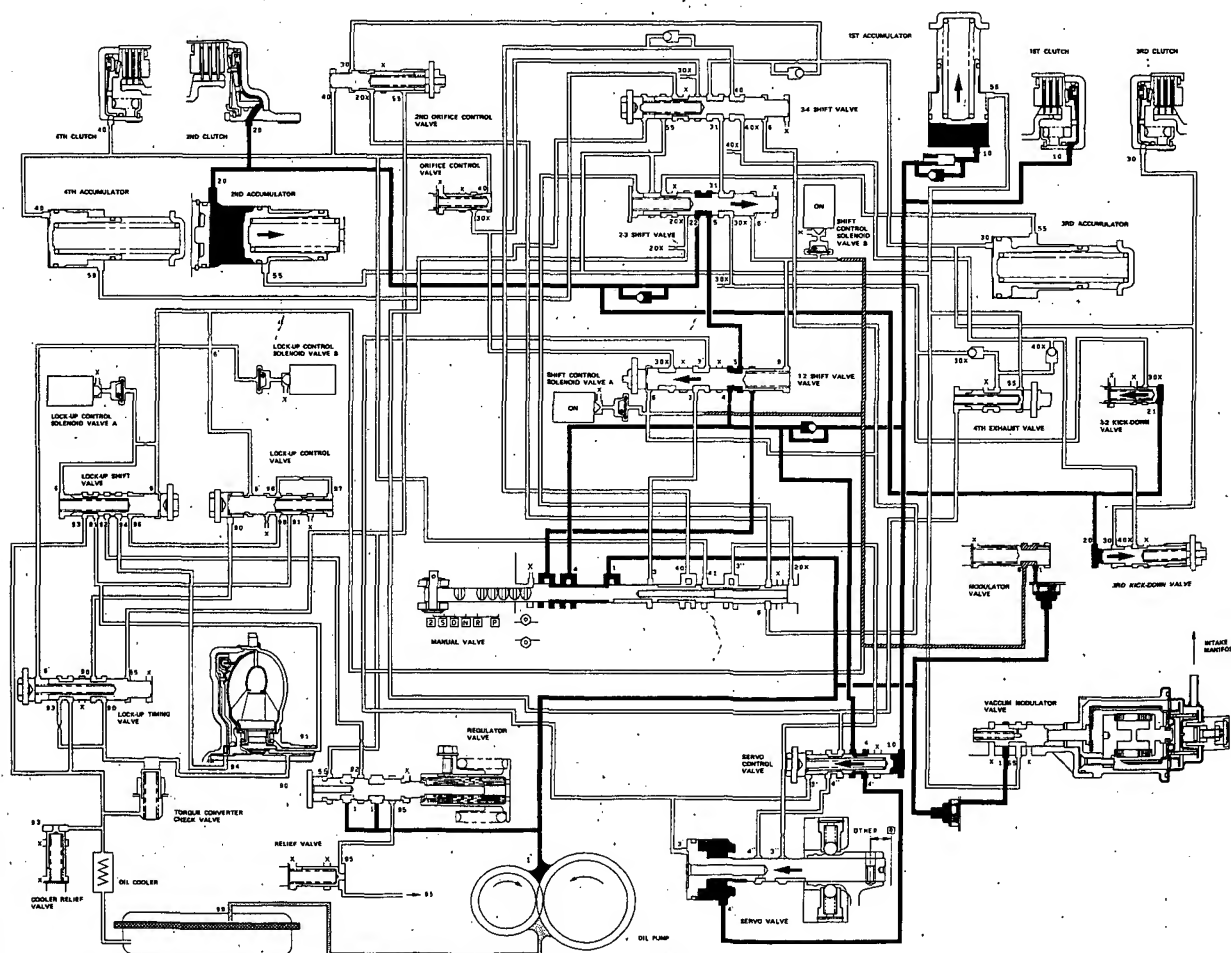
### 2 Position

The line pressure (1) becomes the line pressure (4) as it passes through the manual valve. It then goes through 2nd clutch pressure (20) to the 2nd clutch. Also, the line pressure (1) goes to the modulator valve through the filter and becomes the modulator pressure (6).

The line pressure (4) also flows to the vacuum modulator valve (throttle valve B).

The line pressure (4) passing through the orifice becomes the 1st clutch pressure (10) and flows to the 1st clutch. However no power is transmitted by means of the one-way clutch.

NOTE: When used, "left" or "right" indicates direction on the flowchart.





# **S or D Position**

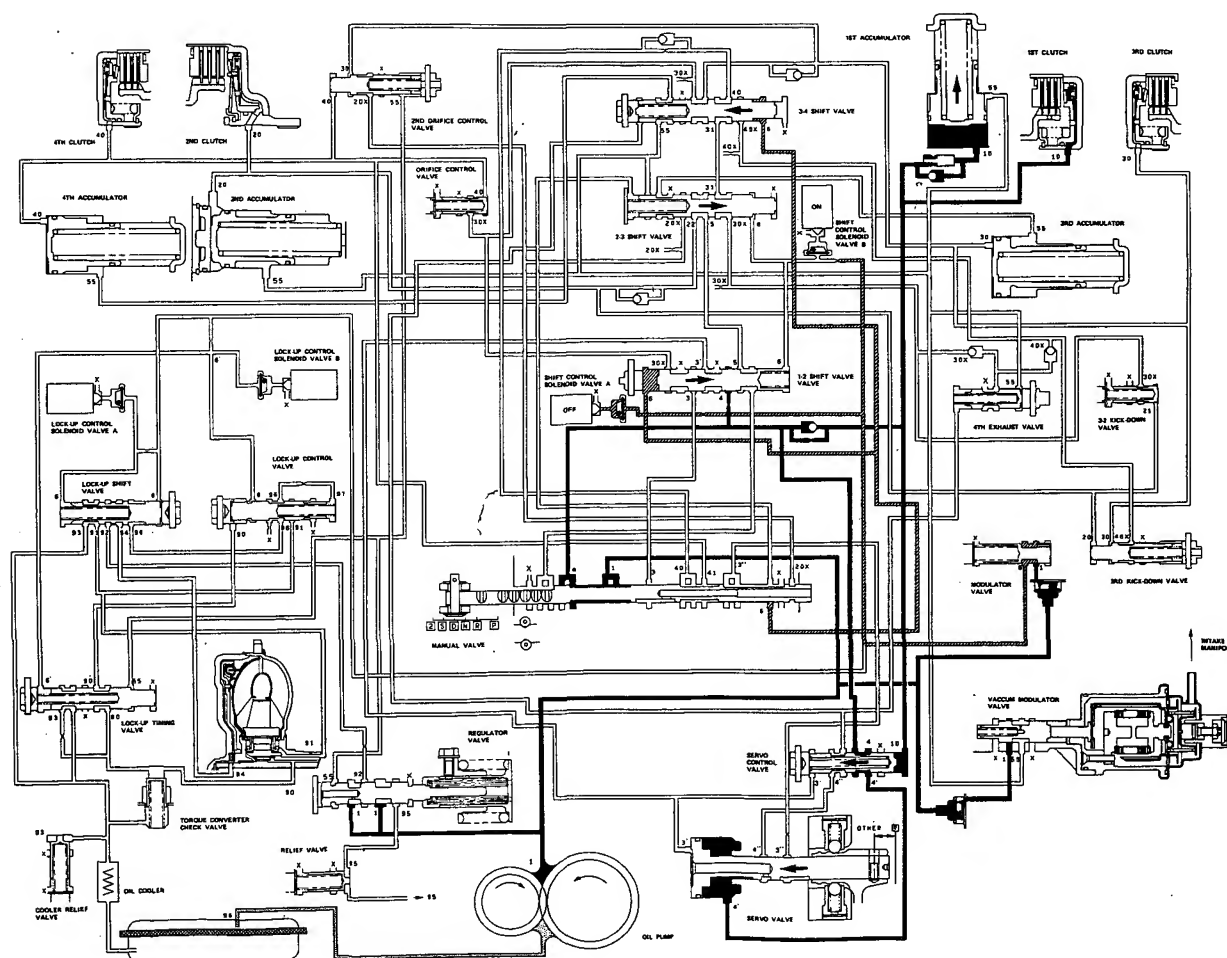
## **1. 1st Speed**

The flow of fluid through the torque converter is the same as in **N** position.

The line pressure (1) becomes the line pressure (4) and it becomes the 1st clutch pressure (10). The 1st clutch pressure is applied to the 1st clutch and 1st accumulator, consequently the vehicle will move as the engine power is transmitted.

The line pressure (1) becomes the modulator pressure (6) by the modulator valve and travels to 1-2 and 3-4 shift valves. The 1-2 shift valve is moved to the right side because the shift control solenoid valve A is turned off and B is turned on by the TCM. This valve stops 2nd clutch pressure and the power is not transmitted to the 2nd clutch. The line pressure (4) also flows to the servo valve and line pressure (1) also flows to vacuum modulator valve (throttle valve B).

NOTE: When used, "left" or "right" indicates direction on the flowchart.



(cont'd)

# Description

## Hydraulic Flow (cont'd)

### 2. 2nd Speed

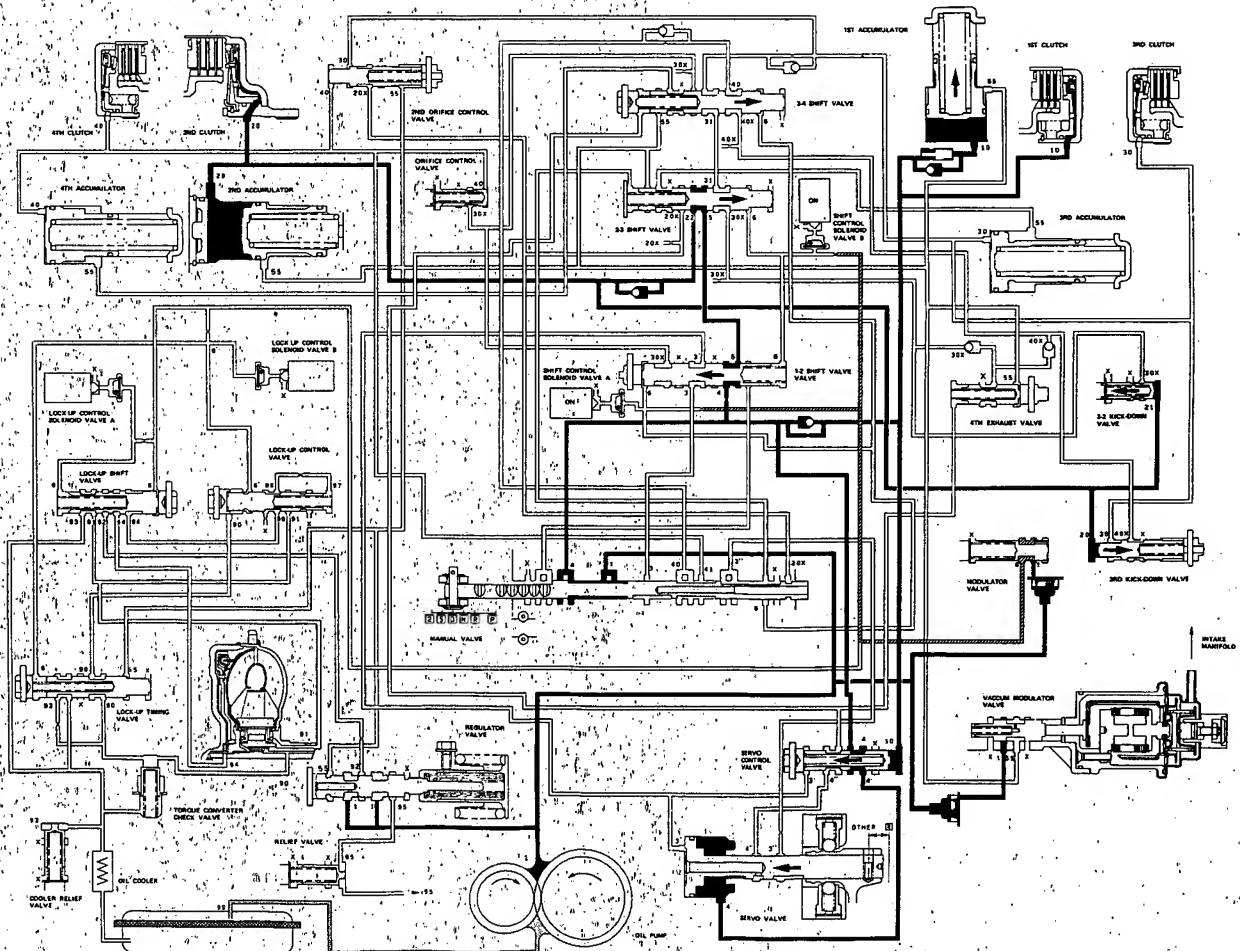
The flow of fluid up to the 1-2 and 2-3 shift valves is the same as in the 1st speed range. As the speed of the car reaches the prescribed value, the solenoid valve A is turned on by means of the TCM. As a result, the 1-2 shift valve is moved to the left and uncovers the oil port leading to the 2nd clutch; the 2nd clutch is engaged.

Fluid flows by way of:

—Line Pressure (4) → 1-2 Shift Valve —Line Pressure (5) → 2-3 Shift Valve —2nd clutch Pressure (22) → Orifice —2nd clutch Pressure (20) → 2nd clutch.

The line pressure (4) passing through the orifice becomes the 1st clutch pressure (10) and flows to the 1st clutch. However no power is transmitted by means of the one-way clutch.

NOTE: When used, "left" or "right" indicates direction on the flowchart.







## Description

## Hydraulic Flow (cont'd)

#### 4. 4th Speed

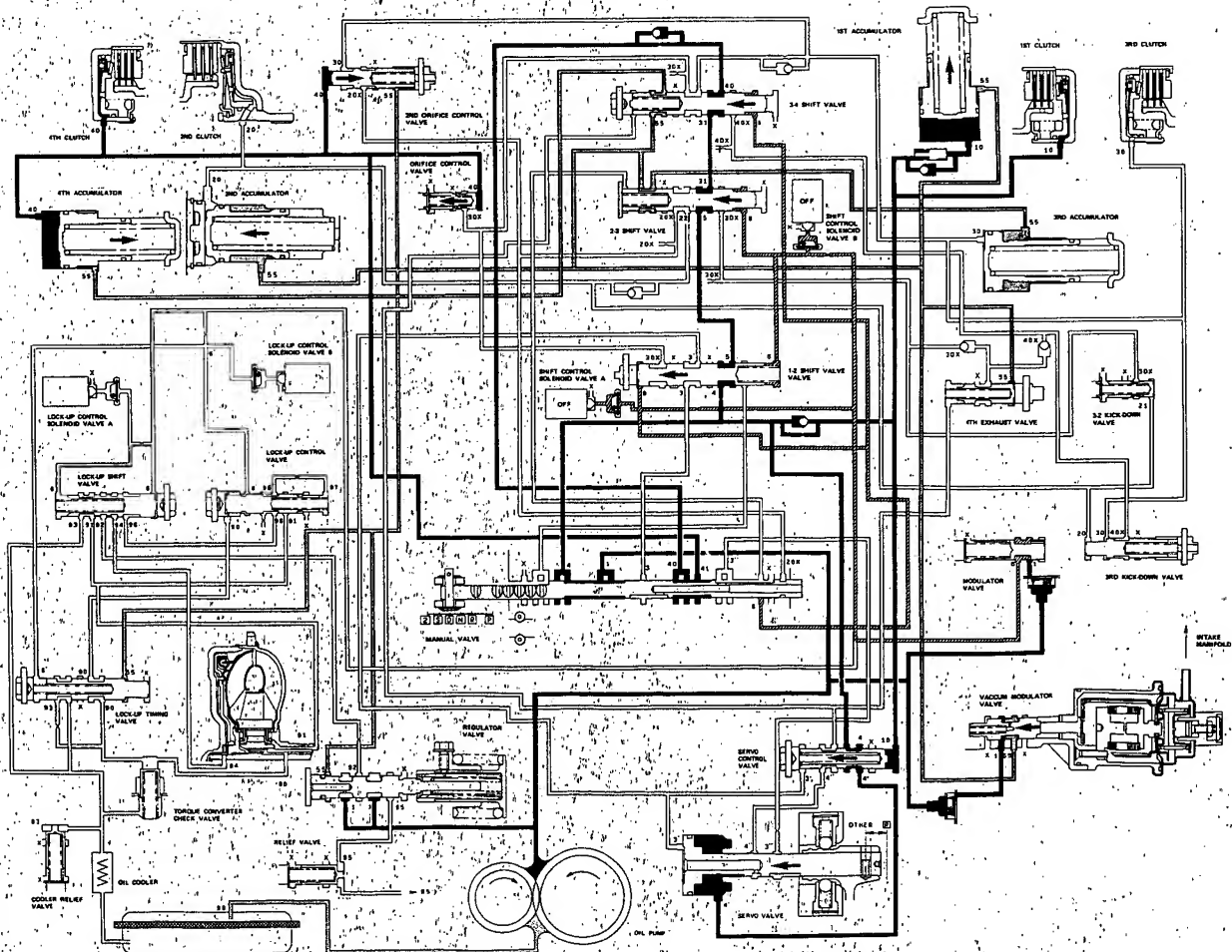
The flow of fluid up to the 1-2, 2-3 and 3-4 shift valves is the same as in the 3rd speed range. As the speed of the car reaches the prescribed value, the shift control solenoid valve A is turned off (shift control solenoid valve B remains off). As this takes place, 3-4 shift valve is moved to the left and uncovers the oil port leading to the 4th clutch. Since the 1-2 and 2-3 shift valves are kept on the left side, the fluid flows through the 4th clutch; the power is transmitted through the 4th clutch.

### Fluid flows by ways of:

—Line Pressure (4)→1-2 Shift Valve—Line Pressure (5)→2-3 Shift Valve—3rd Clutch Pressure (31)→3-4 Shift Valve—4th Clutch Pressure (40)→Manual Valve—4th Clutch Pressure (40)→4th Clutch.

The line pressure (4) passing through the orifice becomes the 1st clutch pressure (10) and flows to the 1st clutch. However, no power is transmitted by means of the one-way clutch.

NOTE: When used, "left" or "right" indicates direction on the flowchart.





## R Position

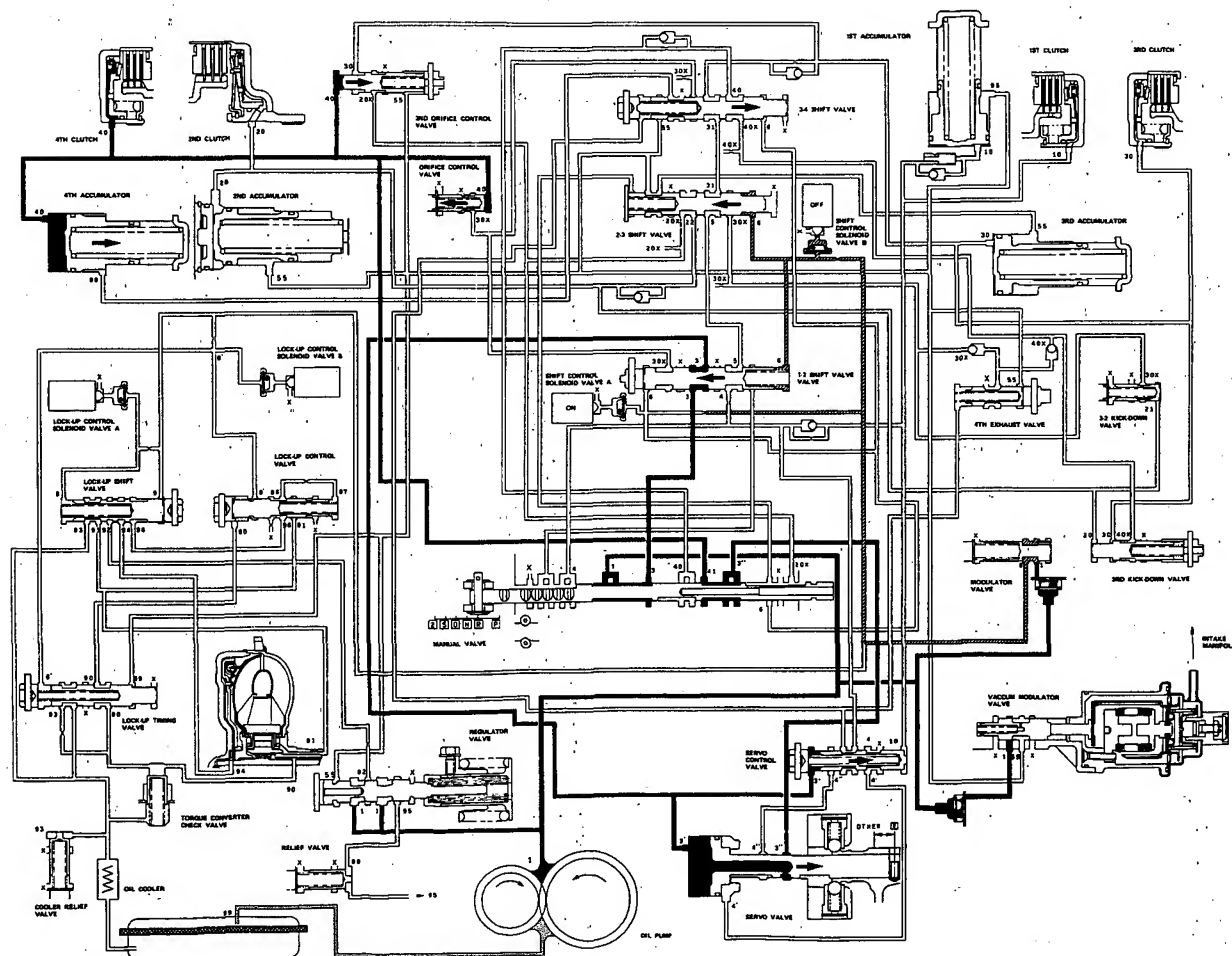
The flow of fluid through the torque converter circuit is the same as in the **N** position. The fluid (1) from the oil pump flows through the manual valve and becomes the line pressure (3). It then flows through the 1-2 shift valve to the servo valve into the reverse position.

Under this condition, the shift control solenoid valve A is turned on and the valve B is turned off as in 3rd speed. As a result, the 1-2 shift valve is also moved to the left side. The fluid (3') will through the servo valve and manual valve to the 4th clutch; power is transmitted through the 4th clutch.

## Reverse Inhibitor Control

When the **R** position is selected while the vehicle is moving forward at a speed over 6 mph (10 km/h), the TCM outputs 1st signal (A: OFF, B: ON), the 1-2 shift valve is moved to the right side. The line pressure (3) is intercepted by the 1-2 shift valve, consequently the power is not transmitted as the 4th clutch and servo valve are not operated.

NOTE: When used, "left" or "right" indicates direction on the flowchart.



(cont'd)

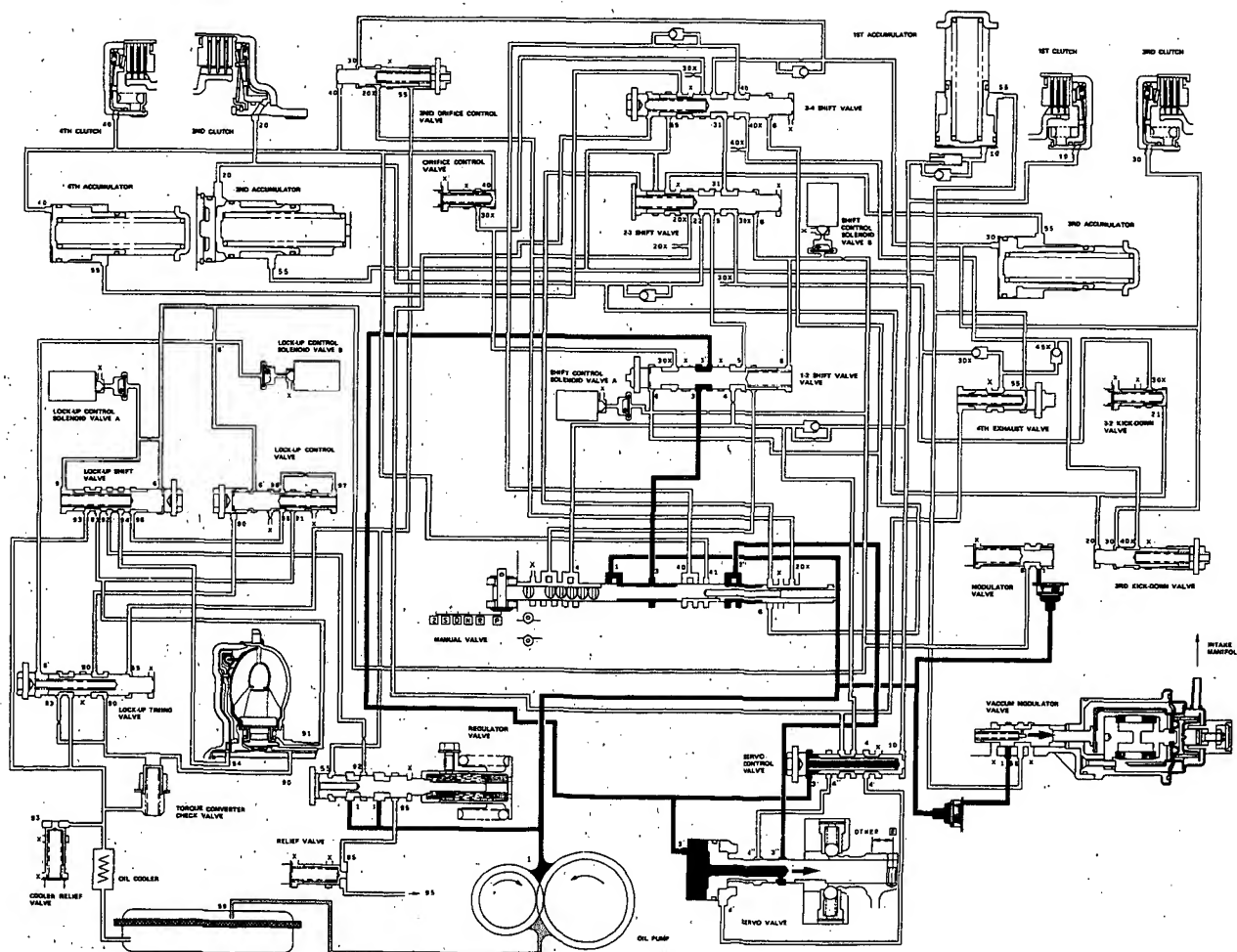
# Description

## Hydraulic Flow (cont'd)

### **P** Position.

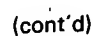
The flow of fluid through the torque converter is the same as in the **N** position. The line pressure (1) becomes line pressure (3) as it passes the manual valve. Then line pressure (3) is applied to the servo valve, causing the reverse shift fork to be moved to the reverse position as in the **R** position.

However, hydraulic pressure is not supplied to the clutches. The power is not transmitted.





The lock-up system controls the range of lock-up according to lock-up control solenoid valves A and B, and vacuum modulator valve (throttle valve B). When lock-up control solenoid valves A and B activate, modulator pressure changes. Lock-up control solenoid valves A and B are mounted on the torque converter housing, and are controlled by the TCM.



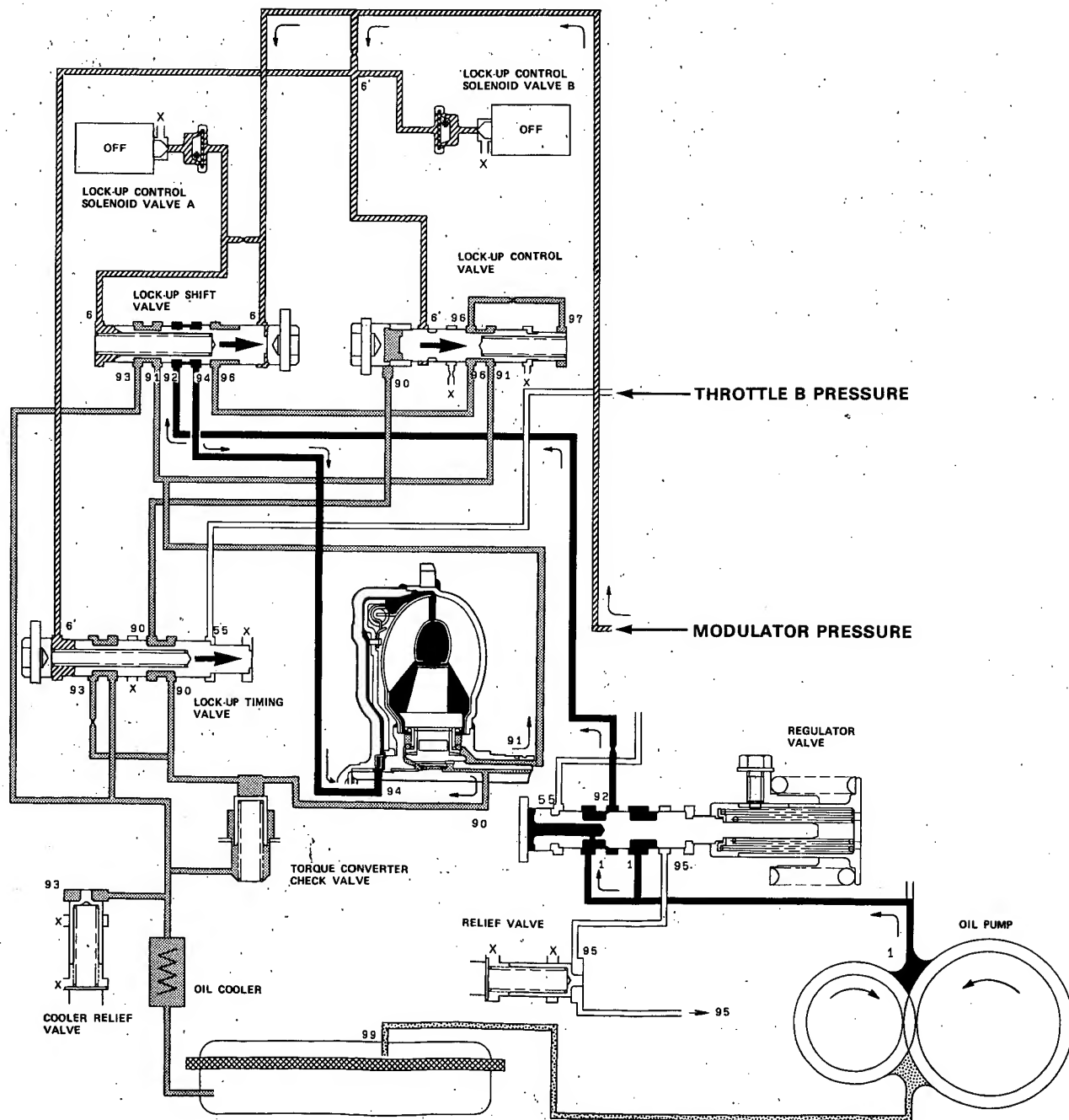
# Description

## Lock-up System (cont'd)

### No Lock-up

Pressurized fluid regulated by the modulator works on both ends of the lock-up shift valve and on the left side of the lock-up control valve. Under this condition, the pressure on both ends of the lock-up shift valve are equal, and the shift valve is moved to the right side by the tension of the valve spring alone. The fluid from the oil pump will flow through the left side of the lock-up clutch to the torque converter; i. e., the lock-up clutch is in off condition.

NOTE: When used, "left" or "right" indicates direction on the flowchart.





### Partial Lock-up

Lock-up Control Solenoid Valve A: ON. Lock-up Control Solenoid Valve B: OFF.

The TCM switches the solenoid valve A on to release the modulator pressure in the left cavity of the lock-up shift valve. The modulator pressure in the right cavity of the lock-up shift valve overcomes the spring force, thus the lock-up shift valve is moved to the left side.

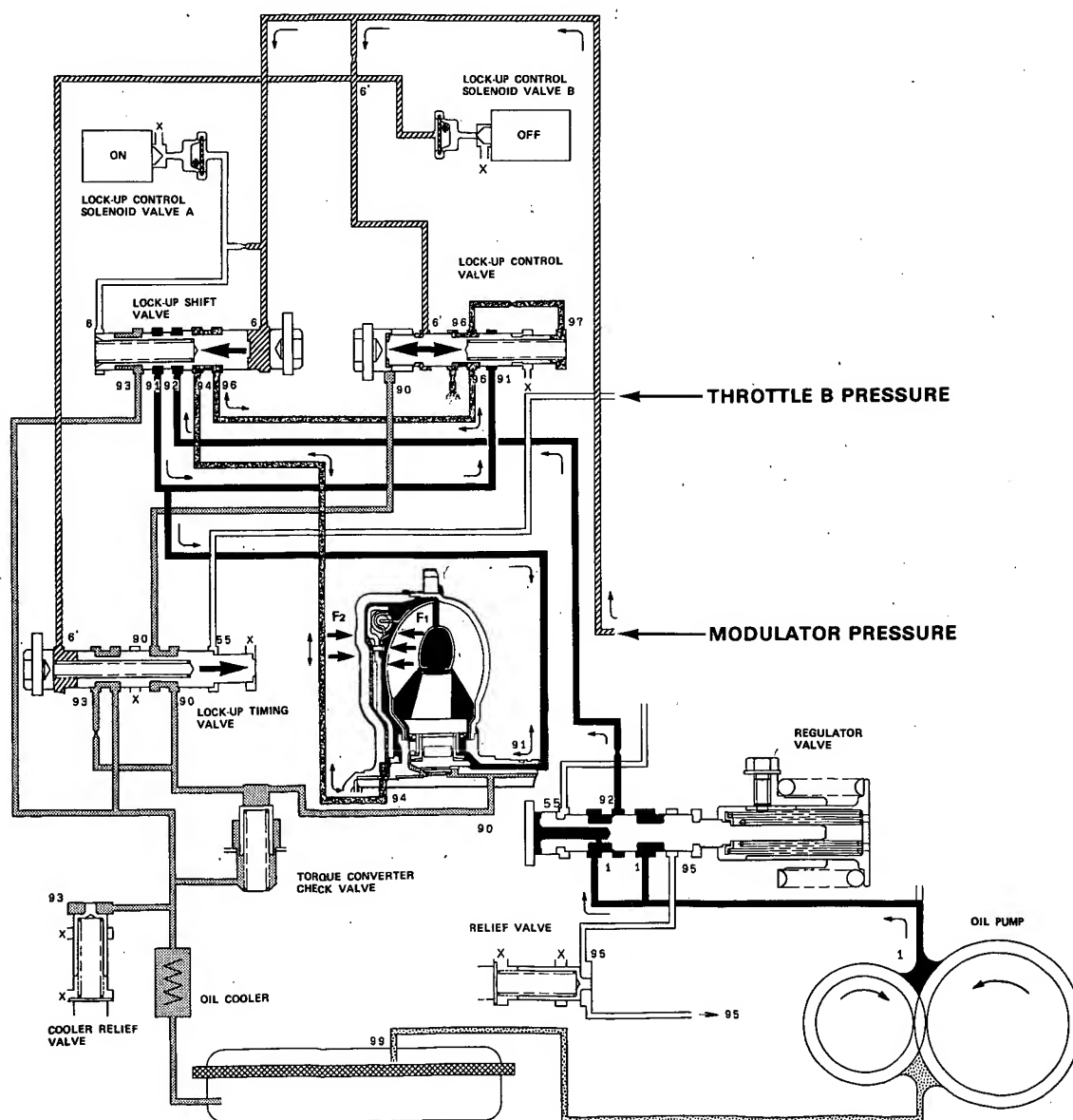
The torque converter is separated into two passages:

Torque Converter Inner Pressure: enters into right side—to engage lock-up clutch

Torque Converter Back Pressure; enters into left side—to disengage lock-up clutch

The back pressure (F2) is regulated by the lock-up control valve whereas the position of the lock-up timing valve is determined by the throttle B pressure, tension of the valve spring and pressure regulated by the modulator. Also the position of the lock-up control valve is determined by the back pressure of the lock-up control valve and torque converter pressure regulated by the check valve. With the lock-up control solenoid valve B kept off, the modulator pressure is maintained in the left end of the lock-up control valve; in other words, the lock-up control valve is moved slightly to the left side. This slight movement of the lock-up control valve causes the back pressure to be lowered slightly, resulting in partial lock-up.

NOTE: When used, "left" or "right" indicates direction on the flowchart.



(cont'd)

## Description

## Lock-up System (cont'd)

### Half Lock-up

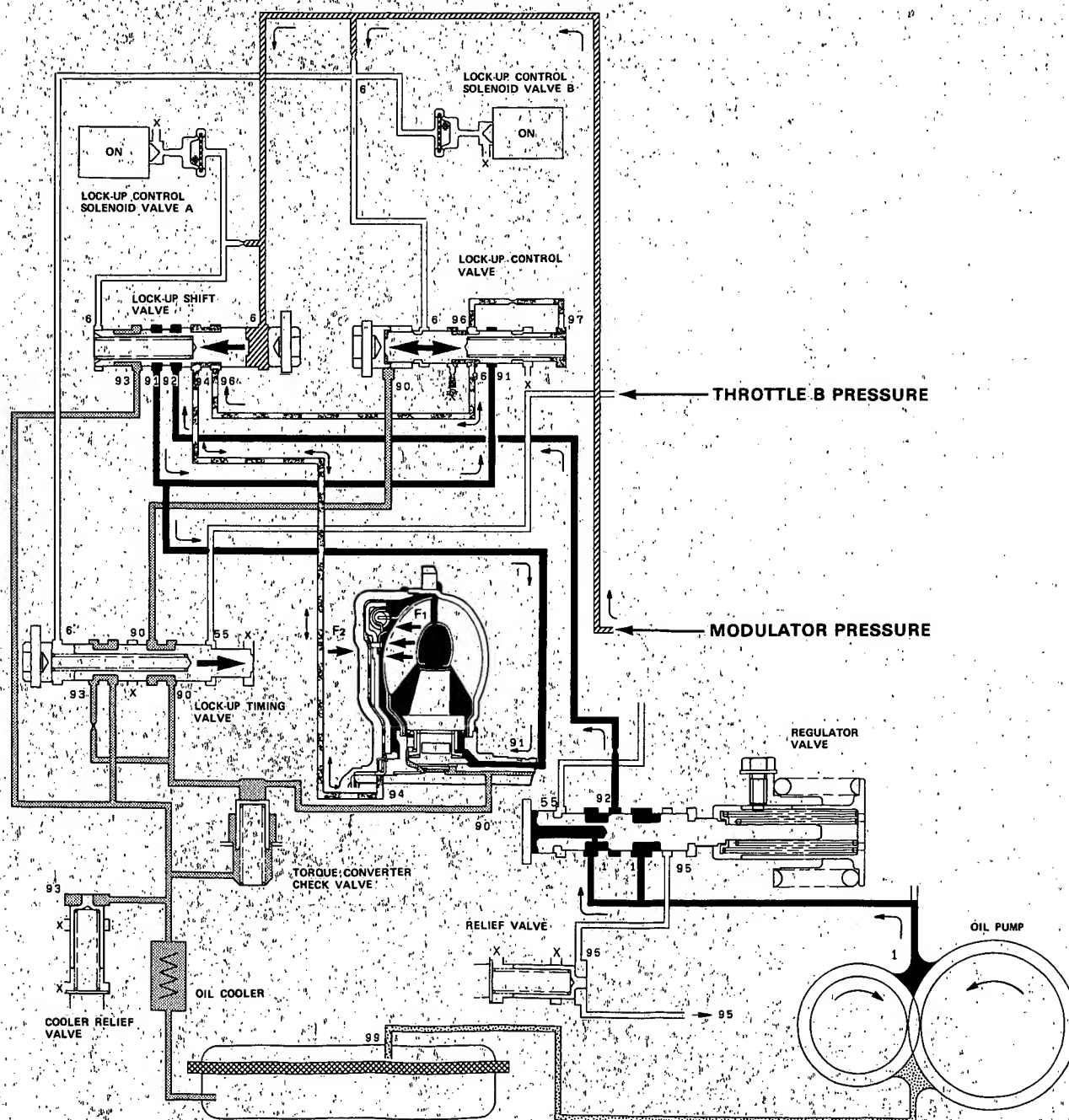
Lock-up Control Solenoid Valve A: ON      Lock-up Control Solenoid Valve B: ON

The modulator pressure is released by the solenoid valve B, causing the modulator pressure in the left cavity of the lock-up control valve to lower.

Also the modulator pressure in the left cavity of the lock-up timing valve is low. However the throttle B pressure is still low at this time, consequently the lock-up timing valve is kept on the right side by the spring force.

With the lock-up control solenoid valve B turned on, the lock-up control valve is moved somewhat to the left side, causing the back pressure (F2) to lower. This allows a greater amount of the fluid (F1) to work on the lock-up clutch so as to engage the clutch. The back pressure (F2), which still exists prevents the clutch from engaging fully.

NOTE: When used, "left" or "right" indicates direction on the flowchart.







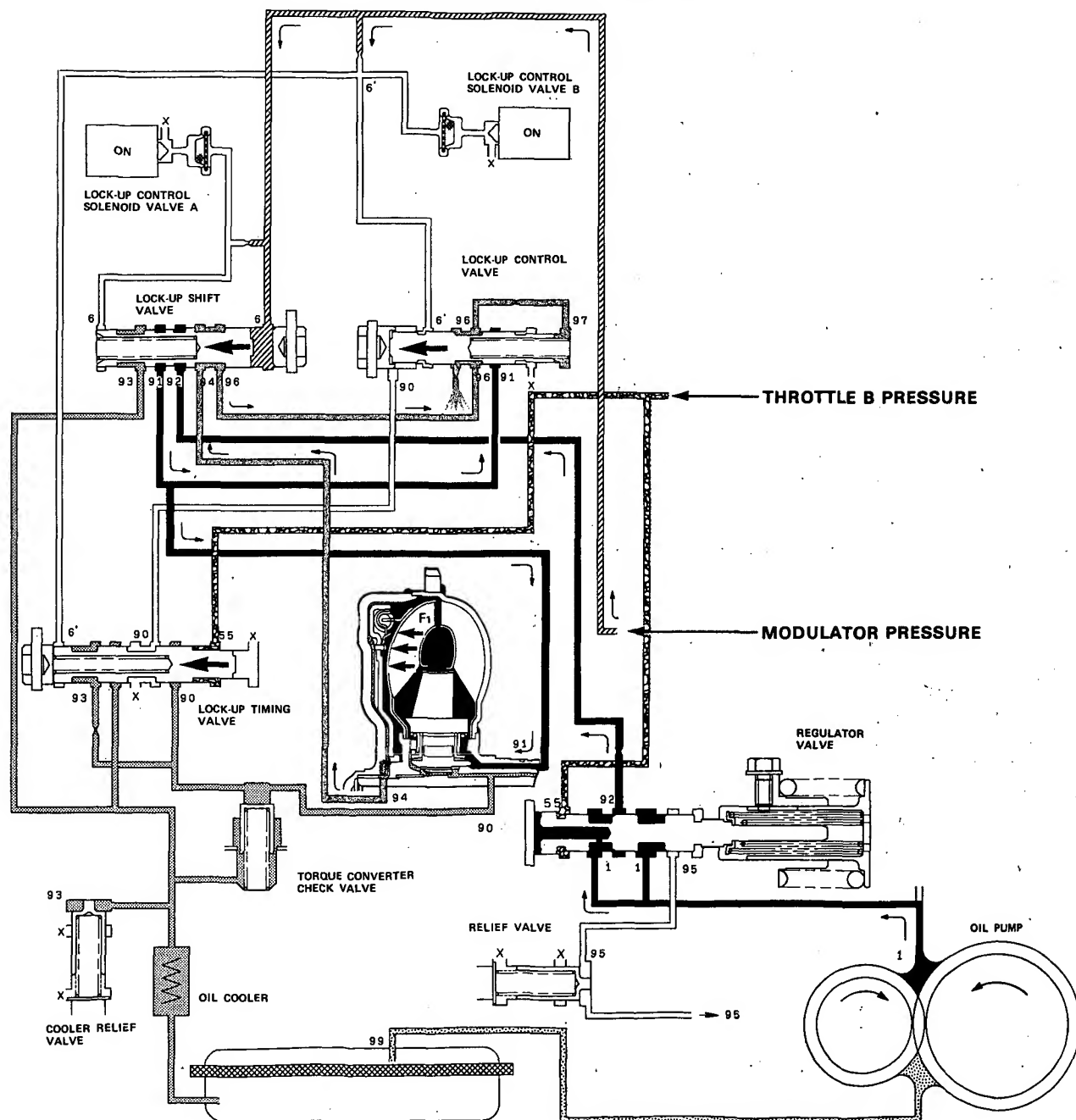
### Full Lock-up

Lock-up Control Solenoid Valve A: ON      Lock-up Control Solenoid Valve B: ON

When the vehicle speed further increases, the throttle B pressure is increased in accordance with the throttle opening. The lock-up timing valve overcomes the spring force and moves to the left side. Also this valve closes the oil port leading to the torque converter check valve.

Under this condition, the throttle B pressure working on the right end of the lock-up timing valve becomes greater than that on the left end; i.e., the lock-up control valve is moved to the left side (modulator pressure in the left end has already been released by the solenoid valve). As this happens, the torque converter back pressure is released fully, causing the lock-up clutch to be engaged fully.

NOTE: When used, "left" or "right" indicates direction on the flowchart.



(cont'd)

# Description

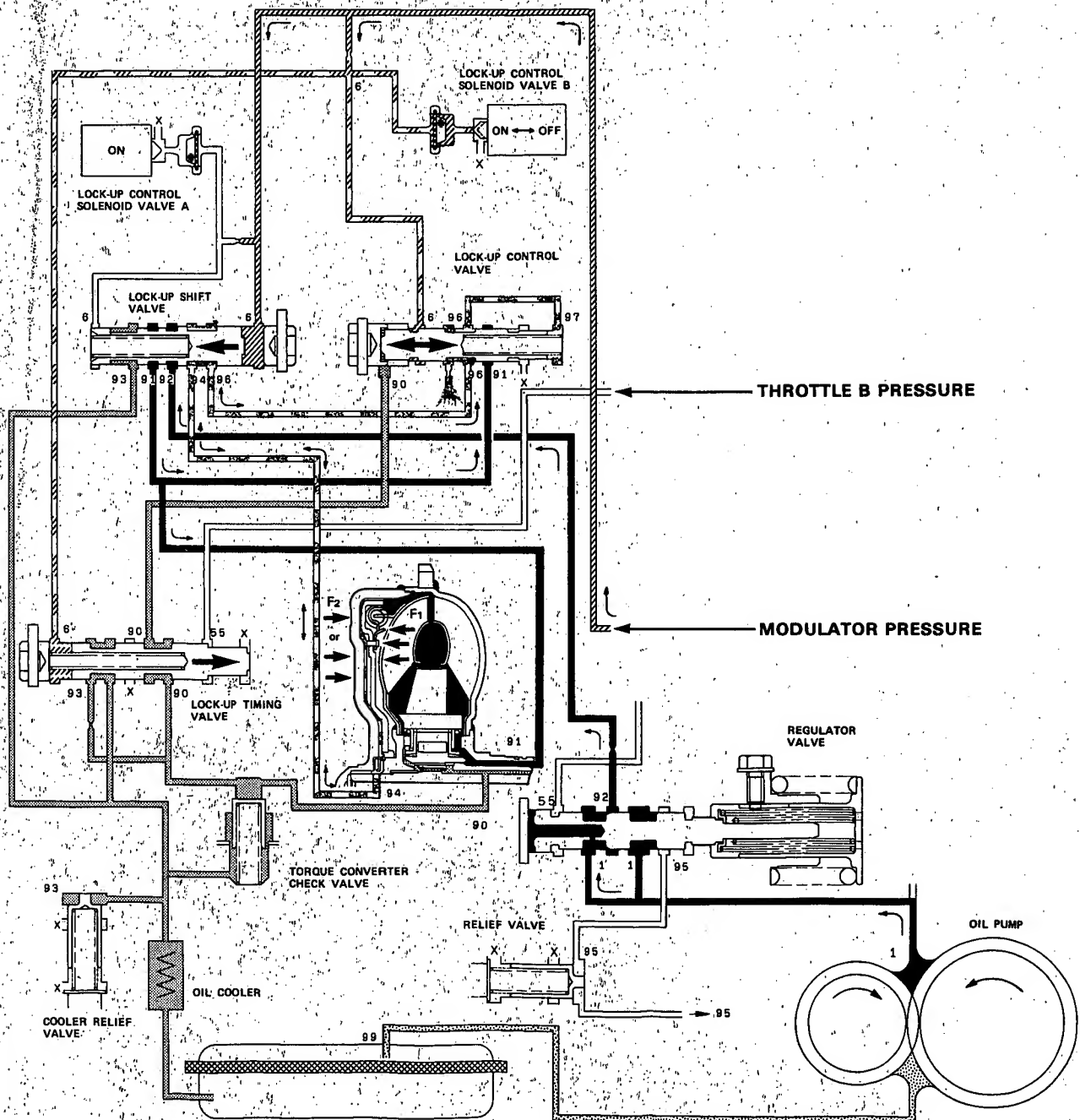
## Lock-up System (cont'd)

### Deceleration Lock-up

Lock-up Control Solenoid Valve A: ON Lock-up Control Solenoid Valve B: Duty Operation (ON — OFF)

The TCM switches solenoid valve B on and off rapidly under certain conditions. The slight lock-up and half lock-up regions are maintained so as to lock the torque converter properly.

NOTE: When used, "left" or "right" indicates direction on the flowchart.

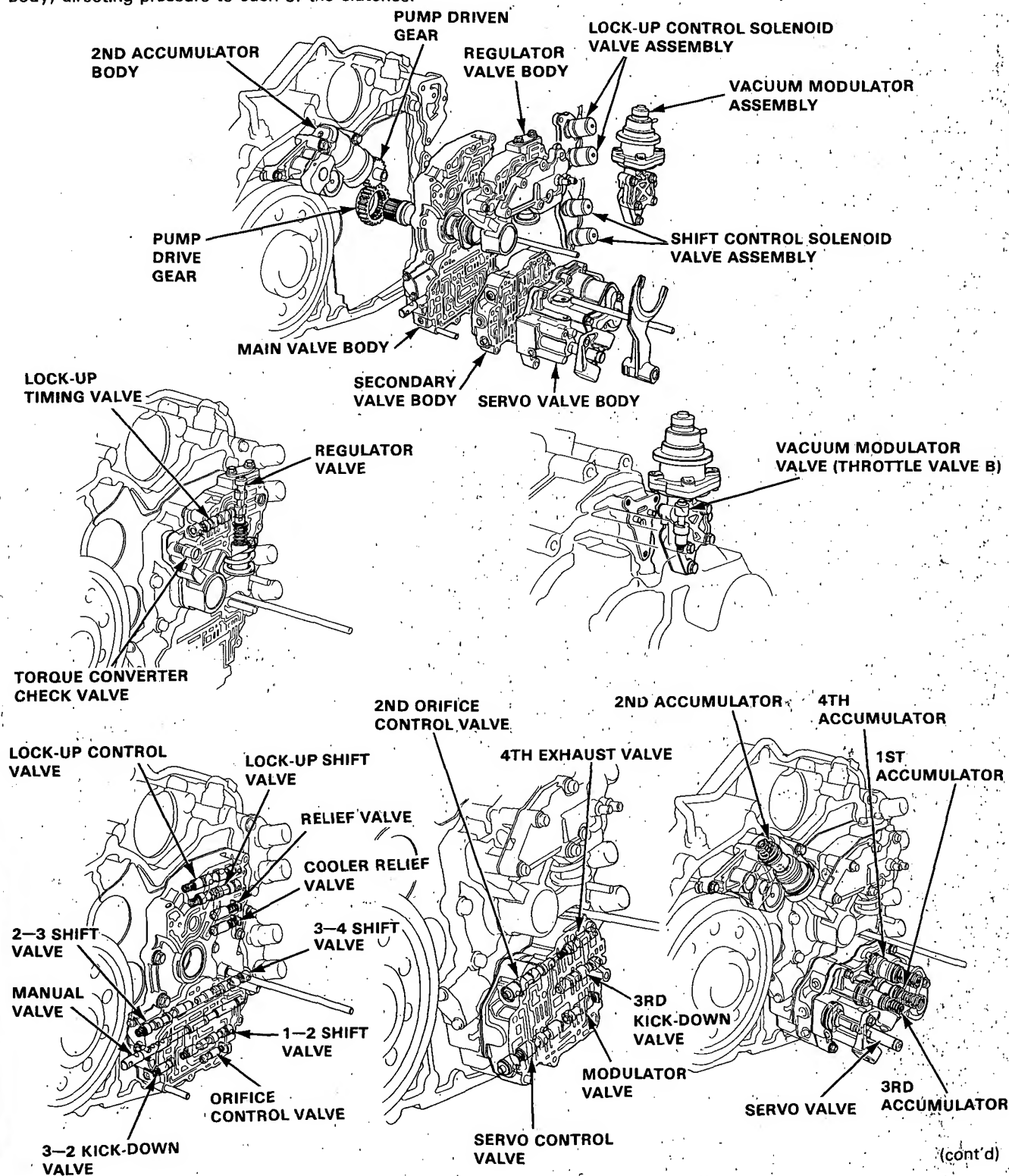




## Hydraulic Control

The valve bodies include the main valve body, the 2nd accumulator body, the regulator valve body, the secondary-valve body, the servo valve body, and the vacuum modulator assembly.

The oil pump is driven by splines on the right end of the torque converter which is attached to the engine. Oil flows through the regulator valve, to maintain specified pressure through the main valve body to the manual valve, and the servo valve body, directing pressure to each of the clutches.



# Description

## Hydraulic Control (cont'd)

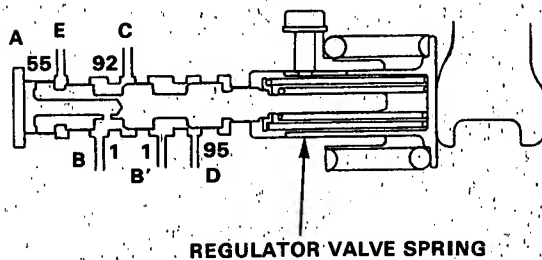
### Regulator Valve

The regulator valve maintains a constant hydraulic pressure sent from the oil pump to the hydraulic control system, while also furnishing oil to the lubricating system and torque converter.

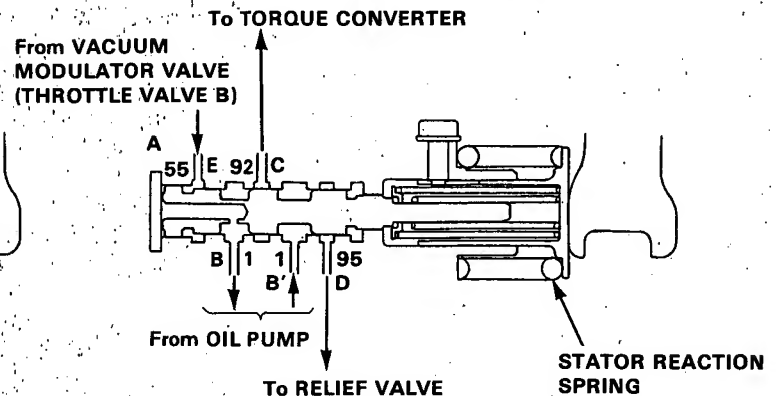
Oil flows through B and B'. The oil which enters through B flows through the valve orifice to A pushing the regulator valve to the right. According to the level of hydraulic pressure through B, the position of the valve changes, and the amount of the oil through B' from D also changes. This operation is continued, maintaining line pressure.

When the accelerator pedal is pressed fully in **S**, **D**, **2** and **R** (full load condition), the throttle pressure B which flows to E is increased, also pushing the regulator valve to the left. Again this reduces the amount of oil relieved from B' into D, causing the levels of hydraulic pressures through B and B' to be raised.

**ENGINE RUNNING in N or P**

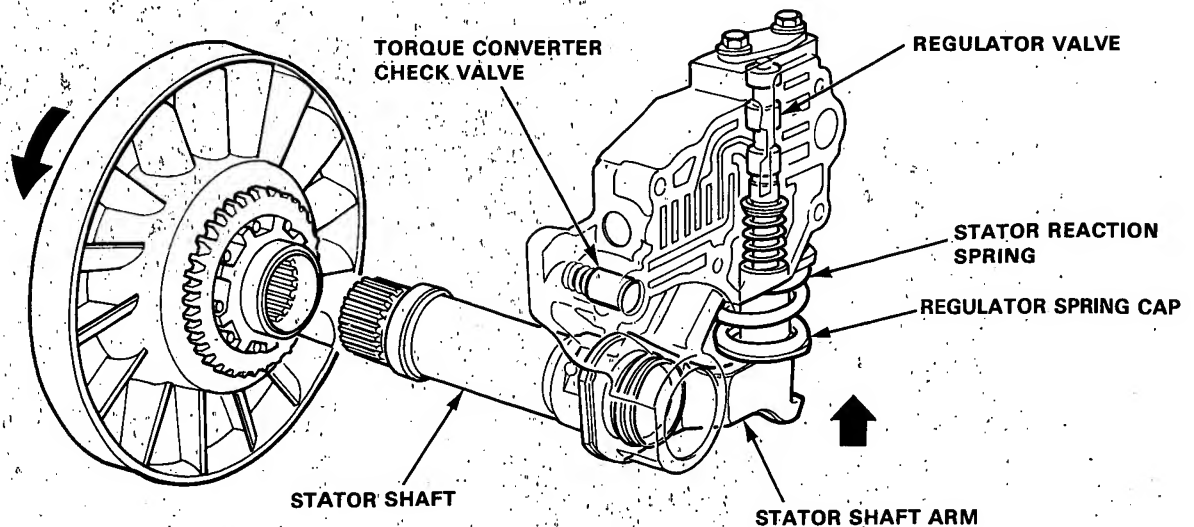


**ENGINE RUNNING in D, S or 2**



### Stator Reaction Hydraulic Pressure Control

Hydraulic pressure increase according to torque is performed by the regulator valve using stator torque reaction. The stator shaft is splined to the stator and its arm end contacts the regulator spring cap. When the car is accelerating or climbing (Torque Converter Range), stator torque reaction acts on the stator shaft and the stator arm pushes the regulator spring cap in this direction in proportion to the reaction. The spring compresses and the valve moves to increase the regulated control pressure or line pressure. Line pressure is maximum when the stator reaction is maximum.





### Vacuum Modulator Valve (Throttle Valve B)

The vacuum modulator valve converts changes in the throttle opening to changes in throttle B pressure.

The operation of the vacuum modulator valve is dependent upon negative pressure produced in the intake manifold.

Thus, with the throttle valve closed, the diaphragm is pulled rightward by the negative pressure produced in the intake manifold. As this takes place, the diaphragm rod is also moved to the right, allowing the vacuum modulator valve to move in the same direction by the tension of the valve spring.

This closes the oil port leading to the hydraulic pressure line, ie. the throttle B pressure becomes naught (0). The schematic diagram below shows the locations of the parts relative to each other when the throttle valve is closed.

As the throttle valve is opened fully, vacuum working on the diaphragm disappears.

As a result, the diaphragm is moved to the left by the tension of the diaphragm spring, causing the diaphragm rod to be moved in the same direction.

The vacuum modulator valve is then pushed by the diaphragm rod to the right. This uncovers the oil port leading to the hydraulic pressure line to increase the throttle B pressure to the maximum.

NOTE: When used, "left" or "right" indicates direction on the figure.

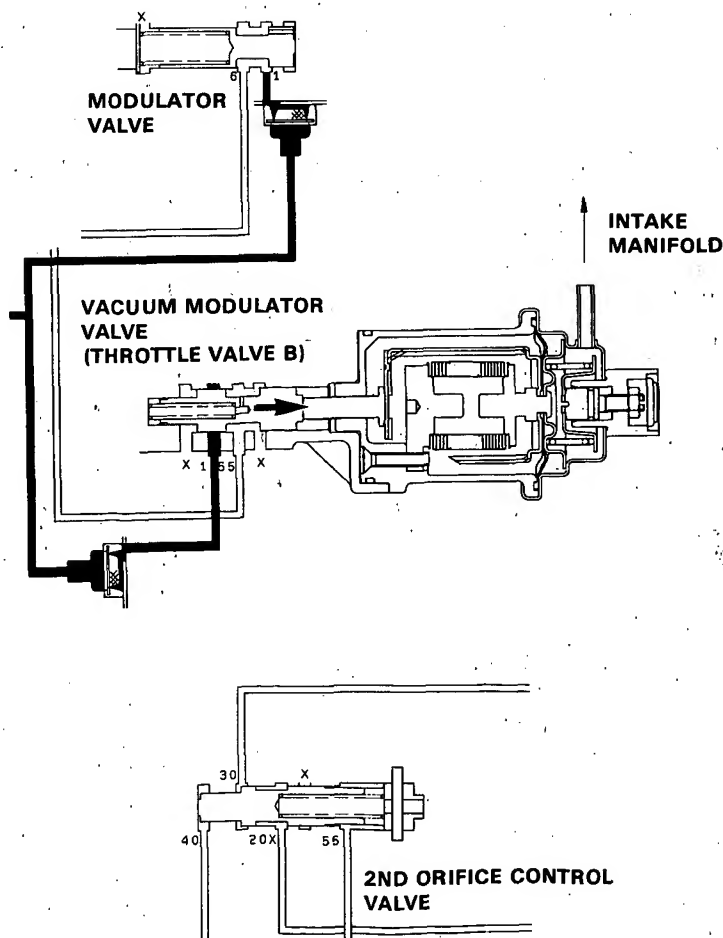
### Modulator Valve

The modulator valve maintains line pressure from the regulator which is supplied to shift control solenoid valves A/B and lock-up control solenoid valves A/B, thus maintaining accurate shift and lock-up characteristics.

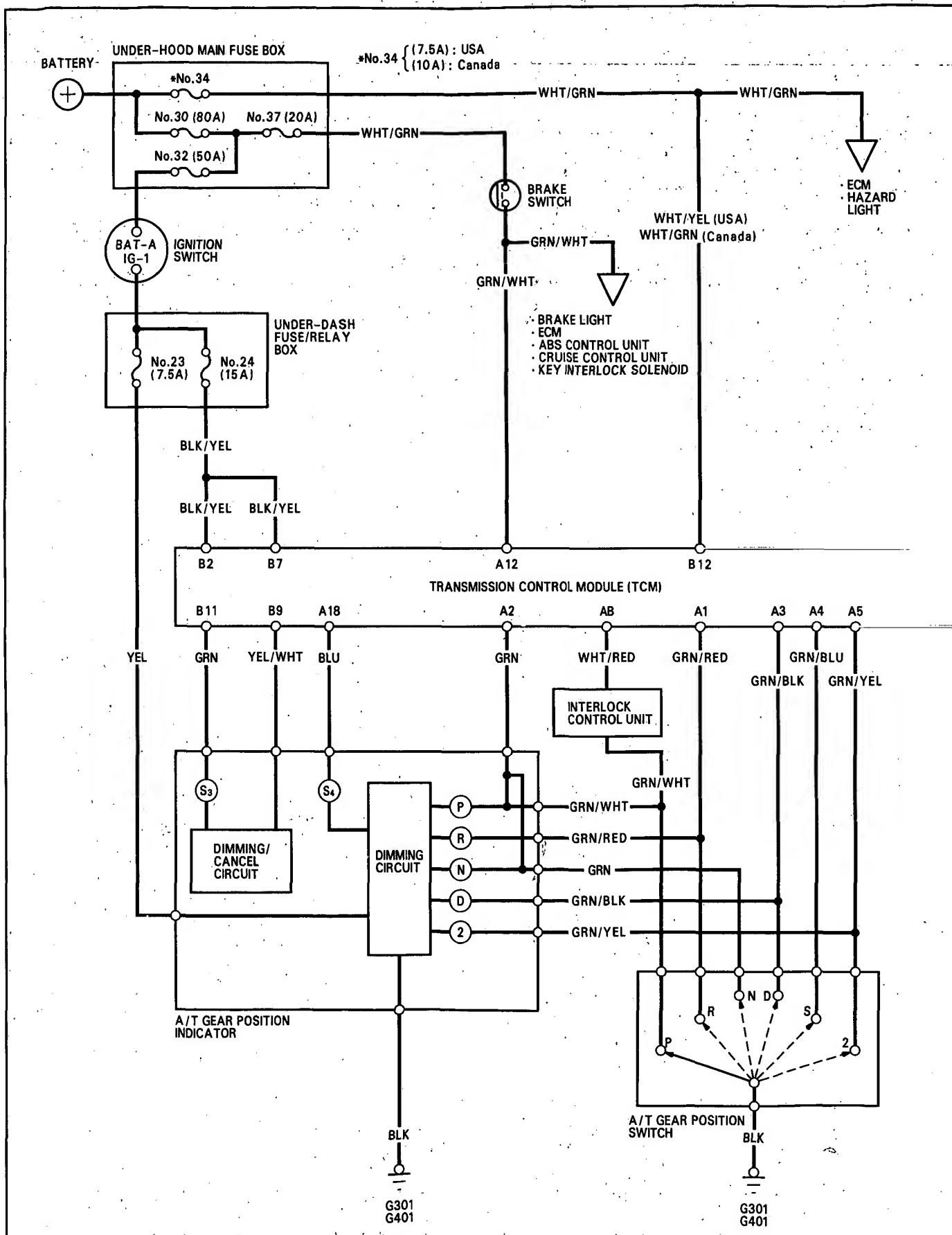
### 2nd Orifice Control Valve

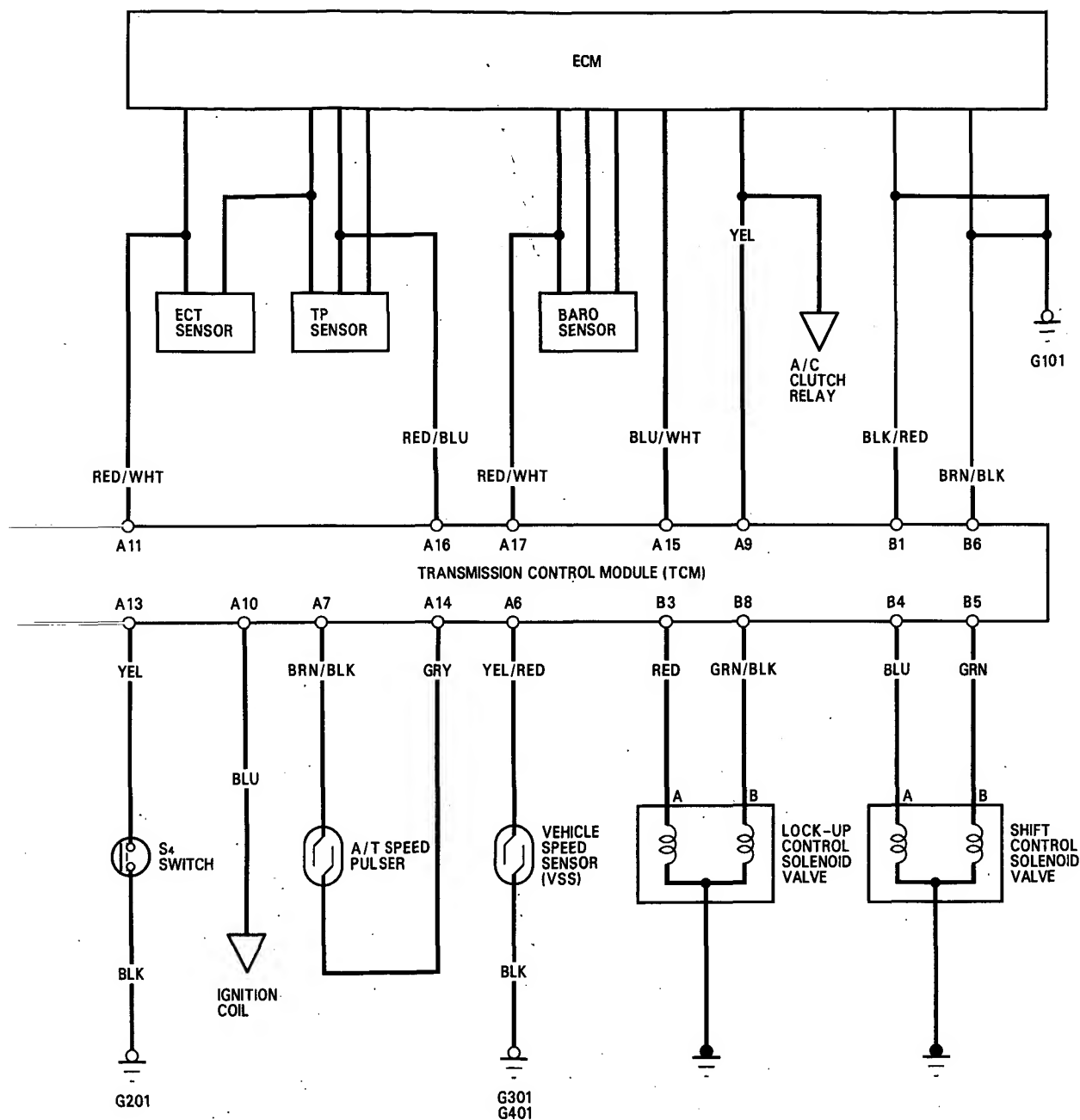
For smooth shifting between 2nd and 3rd gear, the open pressure on the 2nd gear side is relieved through a fixed orifice.

The valve also moves to equalize pressure differences between 2nd and 3rd gears.



# Circuit Diagram



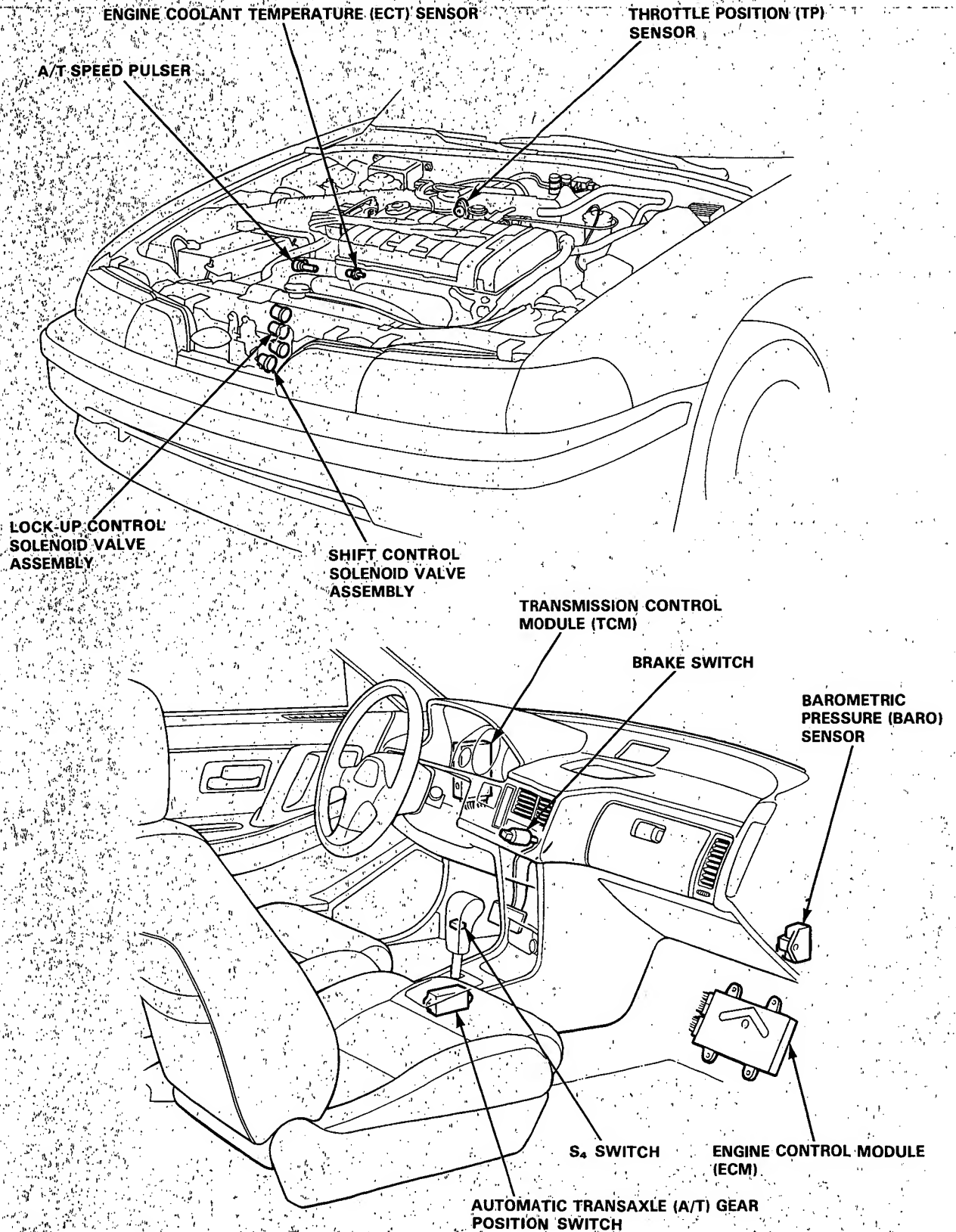


BARO : BAROMETRIC PRESSURE  
ECT : ENGINE COOLANT TEMPERATURE  
TP : THROTTLE POSITION

A8	A7	A6	A5		A4	A3	A2	A1		B5	B4		B3	B2	B1
A18	A17	A16	A15	A14	A13	A12	A11	A10	A9	B12	B11	B9	B8	B7	B6

TERMINAL LOCATION

# Component Location



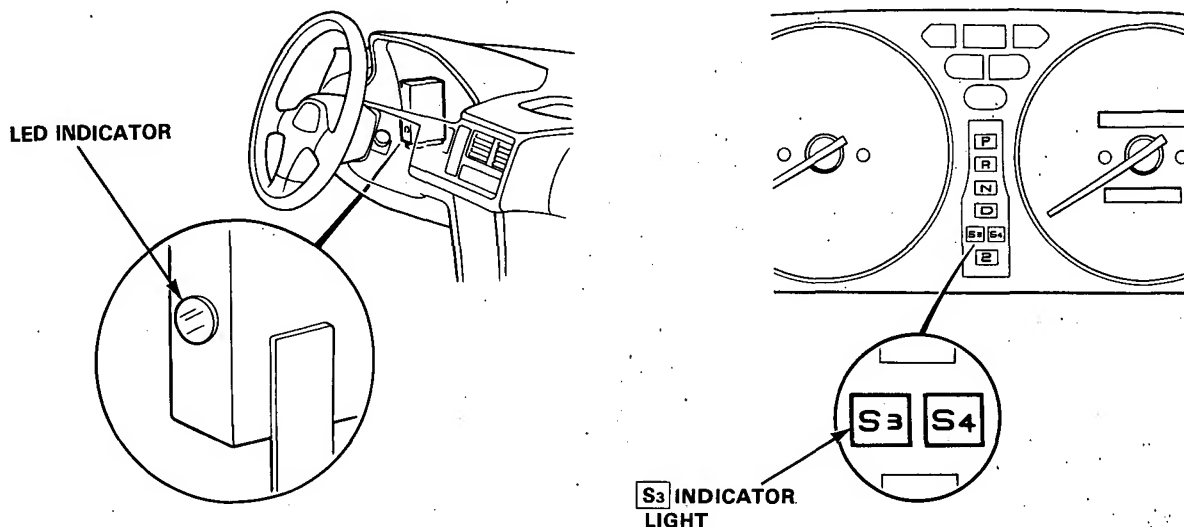


# Troubleshooting Procedures



The Transmission Control Module (TCM) has a built-in self-diagnosis function. The **S<sub>3</sub>** indicator light in the gauge assembly and LED indicator on TCM blink when the TCM senses an abnormality in the input or output systems. The number of blinks from the LED indicator varies according to the problem, which can be diagnosed by counting the number of blinks.

For problem diagnosis count the number of blinks from the LED indicator as shown on the Symptom-to-Component Chart on page 14-34. If no abnormality is found from your inspection, refer to the hydraulic system Symptom-to-Component Chart on page 14-60.



When the ignition switch is turned ON, the **S<sub>3</sub>** indicator light comes on for about two seconds regardless of whether there is a problem. The **S<sub>3</sub>** indicator light will also come on when in **S<sub>3</sub>** mode.

If there is a system problem, the **S<sub>3</sub>** indicator light will come on and continue to blink until the ignition key is turned OFF. When the ignition key is turned ON again, the **S<sub>3</sub>** indicator light will not blink again for the original problem. But if the TCM senses the original abnormality again with ignition switch ON, the **S<sub>3</sub>** indicator light will blink again for the original problem. Therefore, even though the **S<sub>3</sub>** indicator light does not come on when turning the ignition key ON, check the LED display for automatic transmission problem diagnosis.

Since the Diagnostic Trouble Code (DTC) is retained in memory, it will blink again whenever the ignition key is turned on. If the code is not memorized, check the following causes:

- Check the Alternator Sensor fuse (10 A) in the under-hood main fuse box.
- Check for an open circuit in the WHT/YEL wire between the Alternator Sensor fuse (10 A) and A/T control unit B 12 terminal.

After making repair, disconnect the Alternator Sensor fuse (10 A) in the under-hood main fuse box for more than ten seconds to reset LED display memory.

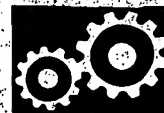
# Electrical Troubleshooting

## Symptom-to-Component Chart

Number of LED display blinks	S3 indicator light	Symptom	Probable Cause	Ref. page
1	Blinks	<ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> <li>Lock-up clutch does not disengage.</li> <li>Unstable idle speed.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected lock-up control solenoid valve A connector.</li> <li>Open or short lock-up control solenoid valve A wire.</li> <li>Faulty lock-up control solenoid valve A.</li> </ul>	14-36
2	Blinks	<ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected lock-up control solenoid valve B connector.</li> <li>Open or short in lock-up control solenoid valve B wire.</li> <li>Faulty lock-up control solenoid valve B.</li> </ul>	14-37
3	Blinks or OFF	<ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected TP sensor connector.</li> <li>Open or short in TP sensor wire.</li> <li>Faulty TP sensor.</li> </ul>	14-38
4	Blinks	<ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected VSS connector.</li> <li>Open or short in VSS wire.</li> <li>Faulty VSS.</li> </ul>	14-39
5	Blinks	<ul style="list-style-type: none"> <li>Fails to shift other than 2nd↔4th gear.</li> <li>Lock-up clutch does not engage.</li> </ul>	<ul style="list-style-type: none"> <li>Short in A/T gear position switch wire.</li> <li>Faulty A/T gear position switch.</li> </ul>	14-40
6	OFF	<ul style="list-style-type: none"> <li>Fails to shift other than 2nd↔4th gear.</li> <li>Lock-up clutch does not engage.</li> <li>Lock-up clutch engages and disengages alternately.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected A/T gear position switch connector.</li> <li>Open in A/T gear position switch wire.</li> <li>Faulty A/T gear position switch.</li> </ul>	14-42
7	Blinks	<ul style="list-style-type: none"> <li>Fails to shift other than 1st↔4th, 2nd↔4th, or 2nd↔3rd gears.</li> <li>Fails to shift (stuck in 4th gear).</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected shift control solenoid valve A connector.</li> <li>Open or short in shift control solenoid valve A wire.</li> <li>Faulty shift control solenoid valve A.</li> </ul>	14-44
8	Blinks	<ul style="list-style-type: none"> <li>Fails to shift (stuck in 1st gear or 4th gear).</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected shift control solenoid valve B connector.</li> <li>Open or short in shift control solenoid valve B wire.</li> <li>Faulty shift control solenoid valve B.</li> </ul>	14-45
9	Blinks	<ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected A/T speed pulser.</li> <li>Open or short in A/T speed pulser wire.</li> <li>Faulty A/T speed pulser.</li> </ul>	14-46
10	Blinks	<ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected ECT sensor connector.</li> <li>Open or short in ECT sensor wire.</li> <li>Faulty ECT sensor.</li> </ul>	14-47
11	OFF	<ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected ignition coil connector.</li> <li>Open or short in ignition coil wire.</li> <li>Faulty ignition coil.</li> </ul>	14-48
13	Blinks	<ul style="list-style-type: none"> <li>Late lock-up clutch engagement.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnected BARO sensor connector.</li> <li>Open or short in BARO sensor wire.</li> <li>Faulty BARO sensor.</li> </ul>	14-49

### NOTE

- If a customer describes the symptoms for codes 3, 6 or 11, yet the LED indicator is not blinking, it will be necessary to recreate the symptom by test driving, and then checking the LED with the ignition still ON.
- If the LED indicator blinks 12 or more than 13 times, the TCM is faulty.
- S3 indicator light and Malfunction Indicator Lamp (MIL)/Check Engine light may come on simultaneously. If so, check the PGM-FI system according to the number of blinks on the MIL/Check Engine light, then reset the memory by removing the alternator sensor fuse (10 A) in the under-hood main fuse box for more than 10 seconds. Drive the vehicle for several minutes at speed over 30 mph (50 km/h), then recheck the MIL/Check Engine light.
- PGM-FI system  
The PGM-FI system on this model is a sequential multiport fuel injection system.



If the self-diagnosis LED indicator does not blink, perform an inspection according to the table listed below.

Symptom	Probable Cause	Ref. page
<b>S<sub>3</sub></b> indicator light is not on for 2 seconds after ignition is first turned on.	—	14-50
Does not change to S <sub>4</sub> mode.	Check S <sub>4</sub> switch signal.	14-51
Fails to shift from 2nd to 1st gear after releasing the brake pedal from a stop when in the <b>S</b> or <b>D</b> position.	Check brake switch signal.	14-52
Shift lever cannot be moved from <b>P</b> position with the brake pedal depressed.	Check shift-lock switch signal.	14-53
Lock-up clutch does not have duty operation (ON↔OFF).	Check A/C signal with A/C on.	14-54
Lock-up clutch does not engage.		

# Electrical Troubleshooting

## Troubleshooting Flowchart

Self-diagnosis LED indicator blinks once.

Disconnect the 12P connector from the TCM.

Turn the ignition switch ON.

Measure the voltage between the B3 (RED) and B1 (BLK/RED) terminals.

Is there voltage?

YES

NO

Turn the ignition switch OFF.

Measure the resistance between the B3 (RED) and B1 (BLK/RED) terminals.

Is the resistance 12-24  $\Omega$ ?

NO

YES

Disconnect the 4P connector from the lock-up control solenoid valve assembly.

Check for continuity between the B3 (RED) and B1 (BLK/RED) terminals.

Is there continuity?

YES

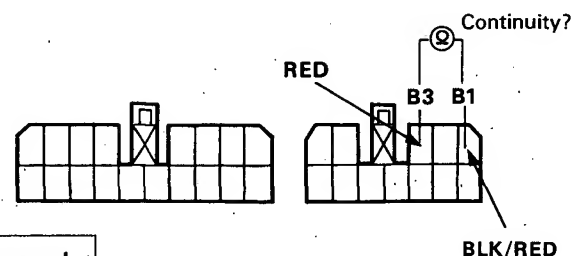
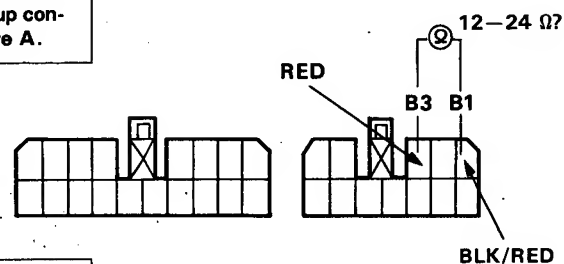
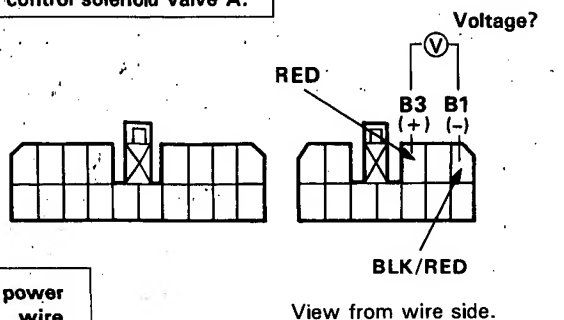
NO

Connect the 4P connector to the lock-up control solenoid valve assembly.

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

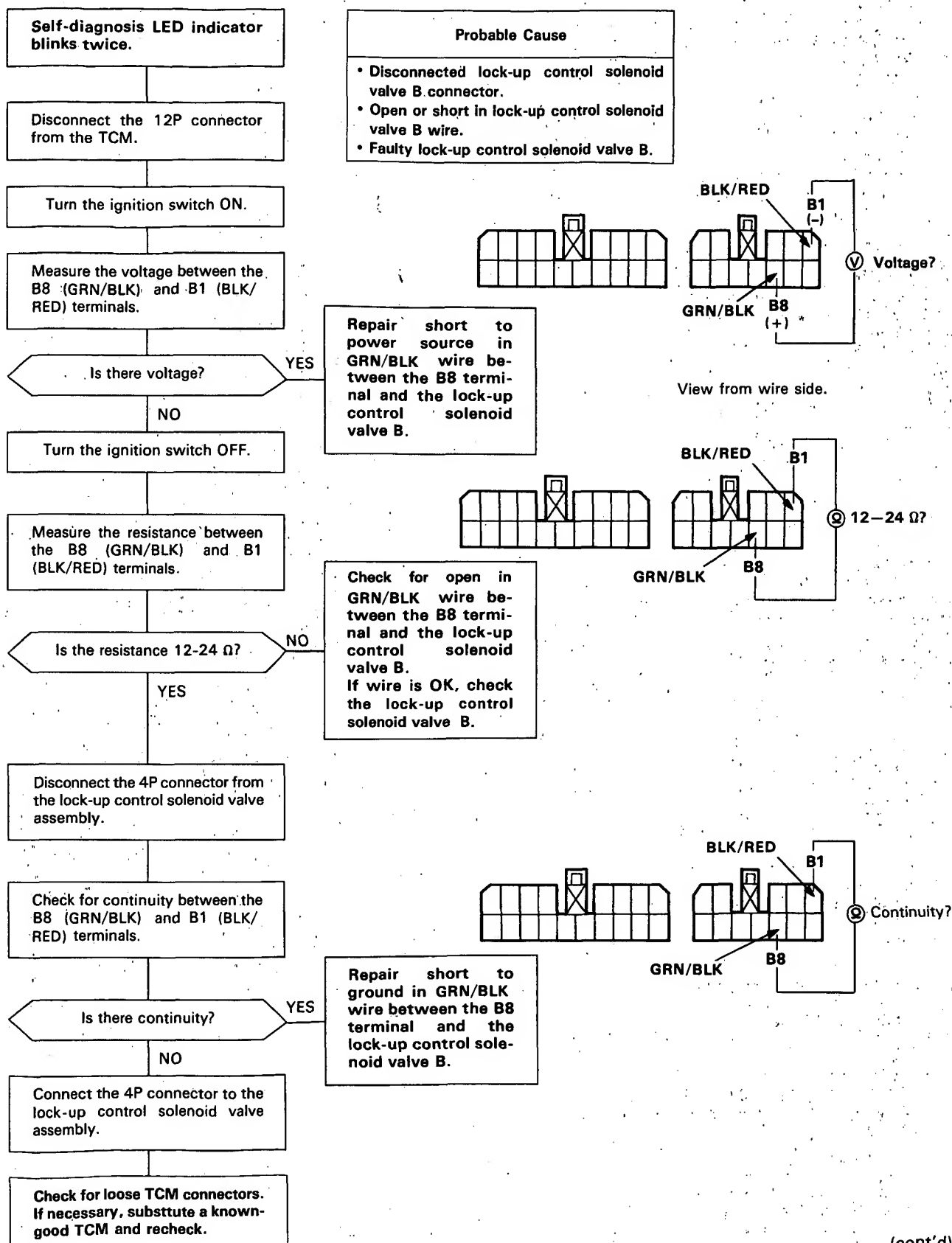
### Probable Cause

- Disconnected lock-up control solenoid valve A connector.
- Open or short lock-up control solenoid valve A wire.
- Faulty lock-up control solenoid valve A.



Repair short to power source in RED wire between the B3 terminal and the lock-up control solenoid valve A.

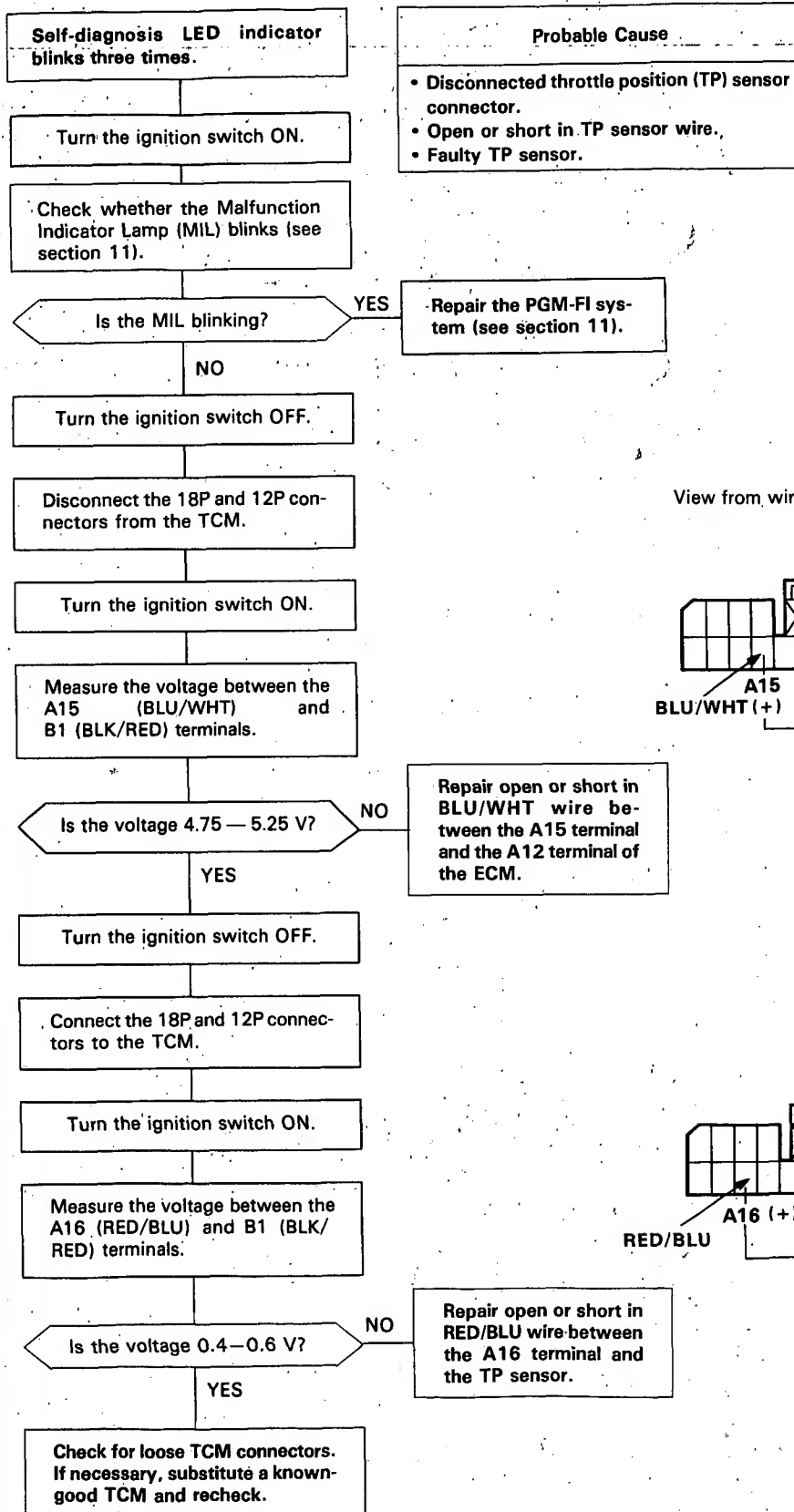
Repair short to ground in RED wire between the B3 terminal and the lock-up control solenoid valve A.



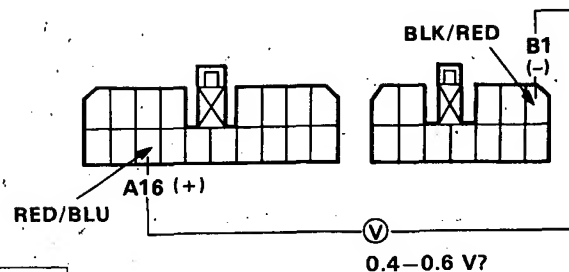
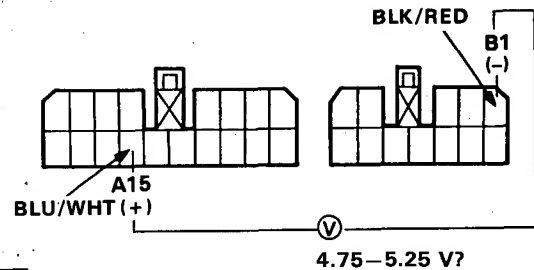
(cont'd)

# Electrical Troubleshooting

## Troubleshooting Flowchart (cont'd)



View from wire side.





**Self-diagnosis LED indicator blinks four times.**

**Probable Cause**

- Disconnected vehicle speed sensor (VSS) connector.
- Open or short in VSS wire.
- Faulty VSS.

Jack up the front of the car and block one wheel.

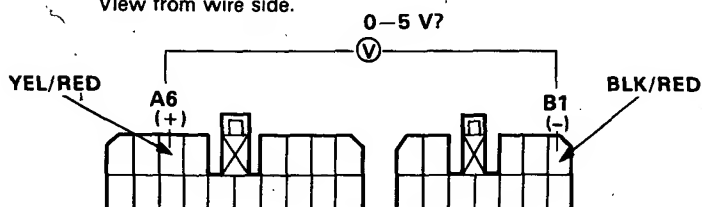
**⚠ WARNING**

- Set the parking brake securely and block the rear wheels.
- Jack up the front of the car and support with safety stands.

Turn the ignition switch ON and shift transmission to **N**.

Rotate the front wheel and measure the voltage between the A6 (YEL/RED) and B1 (BLK/RED) terminals.

View from wire side.



Does the voltage 0 — 5 V appear alternately?

NO

Substitute a known-good TCM and recheck.

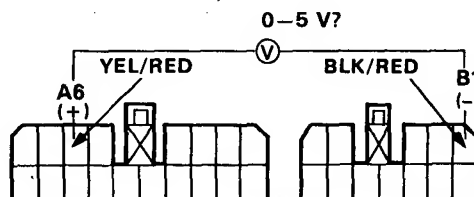
YES

Turn the ignition switch OFF.

Disconnect the 18P and 12P connectors from the TCM.

Turn the ignition switch ON.

Rotate the front wheel and check for voltage between the B1 (BLK/RED) and A6 (YEL/RED) terminals.



Does 0—5 V or more appears alternately?

NO

Check for short or open in YEL/RED wire between the A6 terminal and the gauge assembly. If wire is OK, check the VSS.

YES

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

(cont'd)

# Electrical Troubleshooting

## Troubleshooting Flowchart (cont'd)

Self-diagnosis LED indicator blinks five times.

Probable Cause

- Short in A/T gear position switch wire.
- Faulty A/T gear position switch.

Turn the ignition switch ON.

NOTE: Code 5 is caused when the TCM receives two gear position inputs at the same time.

Observe the A/T gear position indicator and select each position separately.

Does the indicator light properly?

NO

See A/T gear position indicator inspection (see section 23).

YES

Shift to other than **R** position.

Measure the voltage between the A1 (GRN/RED) and B1 (BLK/RED) terminals.

Is there battery voltage?

NO

Check for short in GRN/RED wire between the A1 terminal and the A/T gear position switch. If wire is OK, check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

YES

Shift to other than **N** and **P** position.

Measure the voltage between the A2 (GRN) and B1 (BLK/RED) terminals.

Is there battery voltage?

NO

Check for short in GRN wire between the A2 terminal and A/T gear position indicator or in GRN/WHT or GRN wires between the A/T gear position indicator and A/T gear position switch. If wire is OK, check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

YES

Shift to other than **D** position.

Measure the voltage between the A3 (GRN/BLK) and B1 (BLK/RED) terminals.

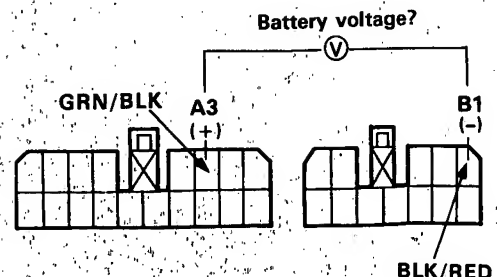
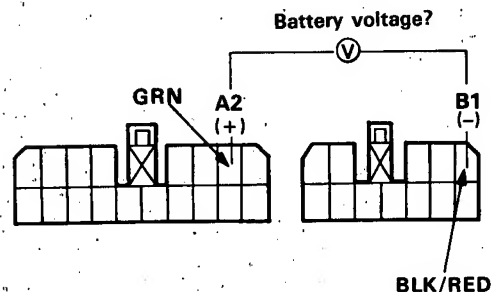
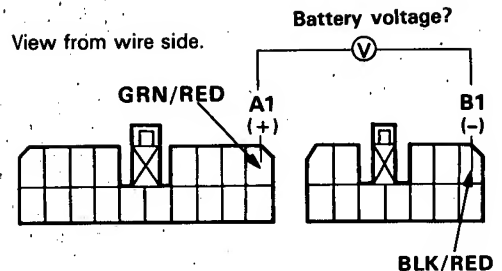
Is there battery voltage?

NO

Check for short in GRN/BLK wire between the A3 terminal and the A/T gear position switch. If wire is OK, check for loose TCM connectors. If necessary, substitute a known-good and recheck.

YES

To page 14-41







From page 14-40

Shift to other than **S** position.

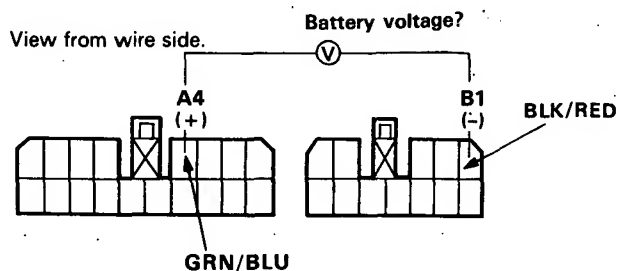
Measure the voltage between the A4 (GRN/BLU) and B1 (BLK/RED) terminals.

Is there battery voltage?

YES

NO

Check for short in GRN/BLU wire between the A4 terminal and the A/T gear position switch. If wire is OK, check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.



Shift to other than **2** position.

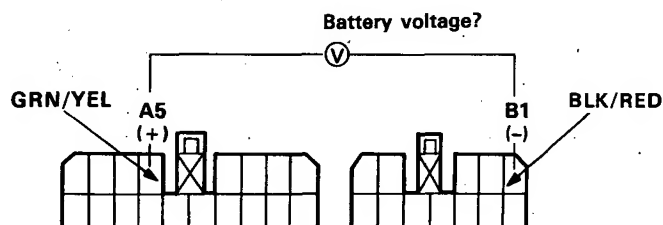
Measure the voltage between the A5 (GRN/YEL) and B1 (BLK/RED) terminals.

Is there battery voltage?

YES

NO

Check for short in GRN/YEL wire between the A5 terminal and the A/T gear position switch. If wire is OK, check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.



Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

(cont'd)

# Electrical Troubleshooting

## Troubleshooting Flowchart (cont'd)

Self-diagnosis LED indicator blinks six times.

Turn the ignition switch ON.

Observe the A/T gear position indicator and select each position separately.

Does the indicator light properly?

NO

See A/T gear position indicator inspection (see section 23).

YES

Shift to **R** position.

Measure the voltage between the A1 (GRN/RED) and B1 (BLK/RED) terminals.

Is there voltage?

YES

Repair open in GRN/RED wire between the A1 terminal and the A/T gear position switch.

NO

Shift to **N** or **P** position.

Measure the voltage between the A2 (GRN) and B1 (BLK/RED) terminals.

Is there voltage?

YES

Repair open in GRN wire between the A2 terminal and the A/T gear position switch.

NO

Shift to **D** position.

Measure the voltage between the A3 (GRN/BLK) and B1 (BLK/RED) terminals.

Is there voltage?

YES

Repair open in GRN/BLK wire between the A3 terminal and the A/T gear position switch.

NO

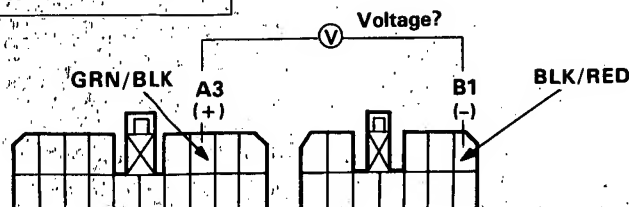
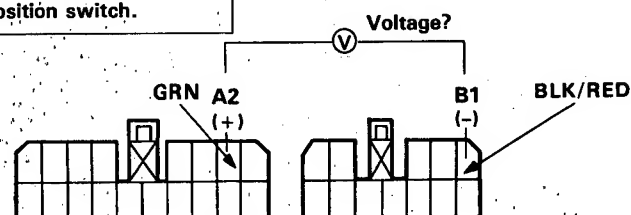
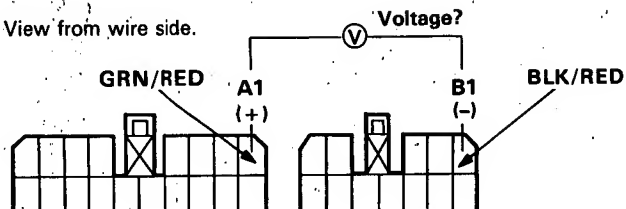
To page 14-43

### Probable Cause

- Disconnected A/T gear position switch connector.
- Open in A/T gear position switch wire.
- Faulty A/T gear position switch.

NOTE: Code 6 is caused when the TCM receives an input for any gear.

View from wire side.





From page 14-42

Shift to **S** position.

Measure the voltage between the A4 (GRN/BLU) and B1 (BLK/RED) terminals.

Is there voltage?

YES

Repair open in GRN/BLU wire between the A4 terminal and the A/T gear position switch.

NO

Shift to **2** position.

Measure the voltage between the A5 (GRN/YEL) and B1 (BLK/RED) terminals.

Is there voltage?

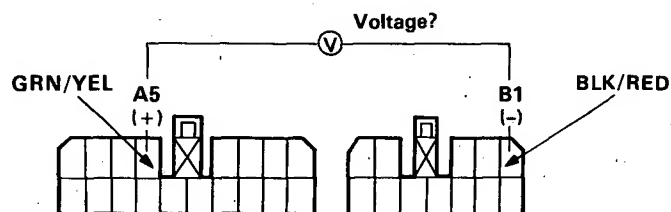
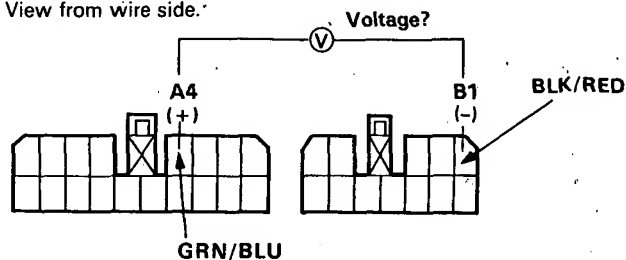
YES

Repair open in GRN/YEL wire between the A5 terminal and the A/T gear position switch.

NO

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

View from wire side.



(cont'd)

# Electrical Troubleshooting

## Troubleshooting Flowchart (cont'd)

Self-diagnosis, LED indicator blinks seven times.

Disconnect the 12P connector from the TCM.

Turn the ignition switch ON.

Measure the voltage between the B4 (BLU) and B1 (BLK/RED) terminals.

Is there voltage?

YES

NO

Turn the ignition switch OFF.

Measure the resistance between the B4 (BLU) and B1 (BLK/RED) terminals.

Is the resistance 12-24  $\Omega$ ?

NO

YES

Disconnect the 2P connector from the shift control solenoid valve assembly.

Check for continuity between the B4 (BLU) and B1 (BLK/RED) terminals.

Is there continuity?

YES

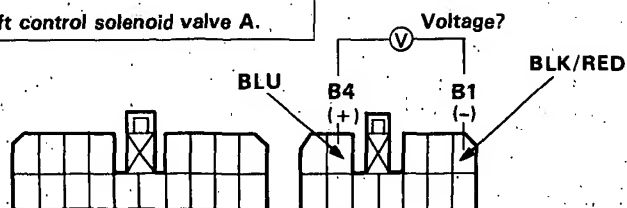
NO

Connect the 2P connector to the shift control solenoid valve assembly.

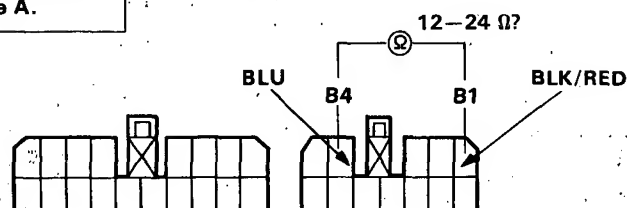
Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

### Probable Cause

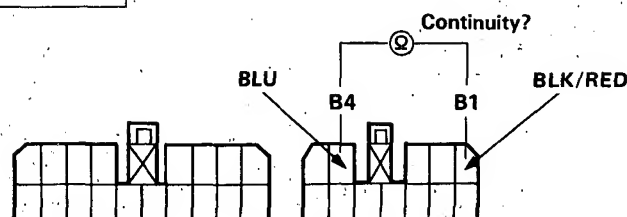
- Disconnected shift control solenoid valve A connector.
- Open or short in shift control solenoid valve A wire.
- Faulty shift control solenoid valve A.



View from wire side.



Check for open in BLU wire between the B4 terminal and the shift control solenoid valve A. If wire is OK, check the shift control solenoid valve A.



Repair short to ground in BLU wire between the B4 terminal and the shift control solenoid valve A.



**Self-diagnosis LED indicator blinks eight times.**

Disconnect the 12P connector from the TCM.

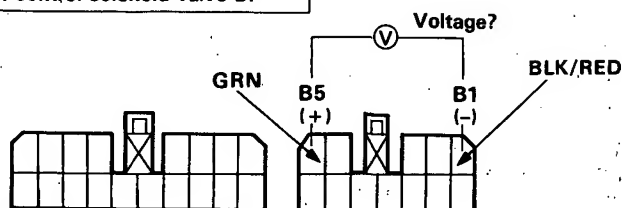
Turn the ignition switch ON.

Measure the voltage between the B5 (GRN) and B1 (BLK/RED) terminals.

Is there voltage? YES

**Probable Cause**

- Disconnected shift control solenoid valve B connector.
- Open or short in shift control solenoid valve B wire.
- Faulty shift control solenoid valve B.



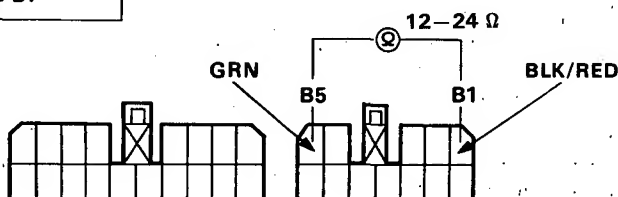
Repair short to power source in GRN wire between the B5 terminal and shift control solenoid valve B.

View from wire side.

Turn the ignition switch OFF.

Measure the resistance between the B5 (GRN) and B1 (BLK/RED) terminals.

Is the resistance 12-24  $\Omega$ ? NO

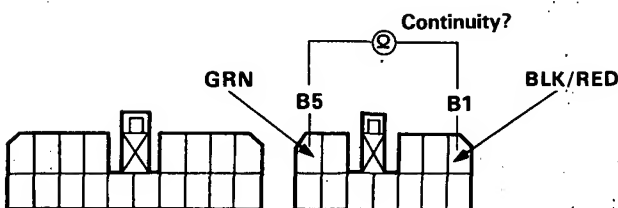


Check for open in GRN wire between the B5 terminal and the shift control solenoid valve B. If wire is OK, check the shift control solenoid valve B.

Disconnect the 2P connector from the shift control solenoid valve assembly.

Check for continuity between the B5 (GRN) and B1 (BLK/RED) terminals.

Is there continuity? YES



Repair short to ground in GRN wire between the B5 terminal and the shift control solenoid valve B.

Connect the 2P connector to the shift control solenoid valve assembly.

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

(cont'd)

# Electrical Troubleshooting

## Troubleshooting Flowchart (cont'd)

Self-diagnosis LED indicator blinks nine times.

### Probable Cause

- Disconnected A/T speed pulser.
- Open or short in A/T speed pulser wire.
- Faulty A/T speed pulser.

Jack up the front of the car and block one wheel.

### ⚠ WARNING

- Set the parking brake securely and block the rear wheels.
- Jack up the front of the car and support with safety stands.

Turn the ignition switch ON.

Rotate the front wheels and measure the voltage between the A7 (BRN/BLK) and A14 (GRY) terminals.

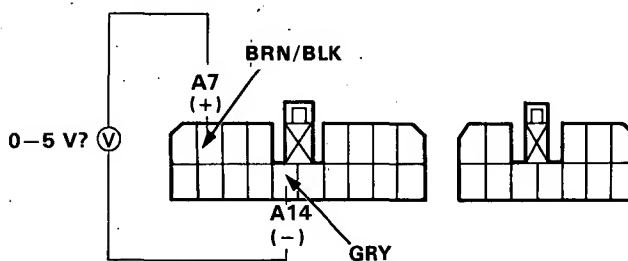
Does the voltage 0—5 V appear alternately?

NO

YES

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

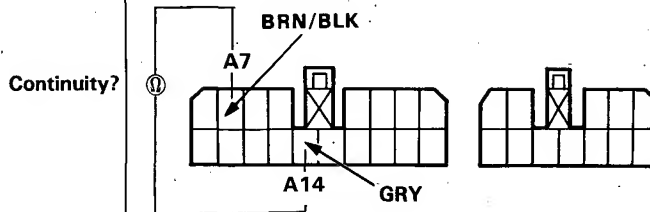
View from wire side.



Turn the ignition switch OFF.

Disconnect the 18P and 12P connectors from the TCM.

Rotate the front wheels and check for continuity between the A7 (BRN/BLK) and A14 (GRY) terminals.



Does the ohmmeter alternately indicate continuity and infinity?

NO

YES

Check for open or short in BRN/BLK or GRY wire between the A7 or A14 terminals and the A/T speed pulser. If wire is OK, check the A/T speed pulser (page 14-55).

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.



**Self-diagnosis LED indicator blinks ten times.**

**Probable Cause**

- Disconnected engine coolant temperature (ECT) sensor connector.
- Open or short in ECT sensor wire.
- Faulty ECT sensor.

Turn the ignition switch ON.

Check whether the Malfunction Indicator Lamp (MIL) blinks (see section 11).

Is the MIL blinking?

YES

NO

**Repair the PGM-FI system (see section 11).**

Turn the ignition switch OFF.

Disconnect the 18P and 12P connectors from the TCM.

Turn the ignition switch ON.

Measure the voltage between the A15 (BLU/WHT) and B1 (BLK/RED) terminals.

Is the voltage 4.75 — 5.25 V?

NO

YES

**Repair open or short in BLU/WHT wire between the A15 terminal and the D16 terminal of the ECM.**

Turn the ignition switch OFF.

Connect the 18P and 12P connectors to the TCM.

Start the engine and warm it up to normal operating temperature (the cooling fan comes on).

Measure the voltage between the A11 (RED/WHT) and B1 (BLK/RED) terminals.

Is the voltage 0.5 — 1.2 V?

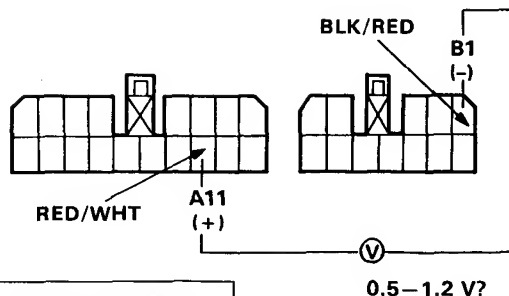
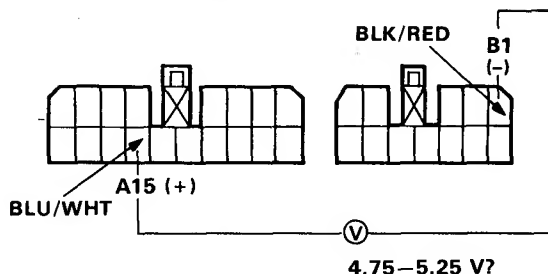
NO

YES

**Repair open or short in RED/WHT wire between the A11 terminal and the ECT sensor.**

**Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.**

View from wire side.



(cont'd)

# Electrical Troubleshooting

## Troubleshooting Flowchart (cont'd)

Self-diagnosis LED indicator blinks eleven times.

Disconnect the 18P and 12P connectors from the TCM.

Start the engine.

Measure the voltage between the A10 (BLU) and B1 (BLK/RED) terminals.

Is there battery voltage?

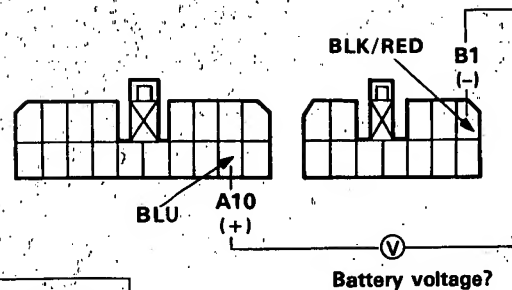
YES

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

### Probable Cause

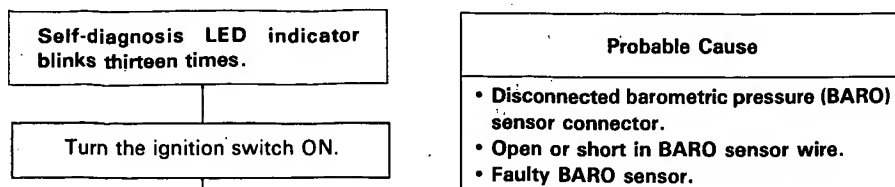
- Disconnected ignition coil connector.
- Open or short in ignition coil wire.
- Faulty ignition coil.

View from wire side.

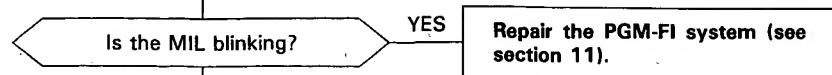


Repair open or short in BLU wire between the A10 terminal and the ignition coil.





Check whether the Malfunction Indicator Lamp (MIL) blinks (see section 11).

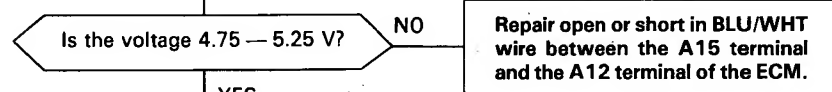


NO  
Turn the ignition switch OFF.

Disconnect the 18P and 12P connectors from the TCM.

Turn the ignition switch ON.

Measure the voltage between the A15 (BLU/WHT) and B1 (BLK/RED) terminals.

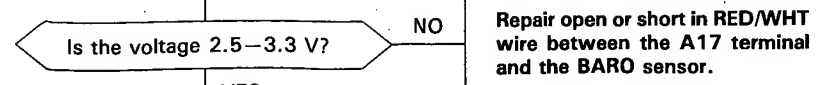


YES  
Turn the ignition switch OFF.

Connect the 18P and 12P connectors to the TCM.

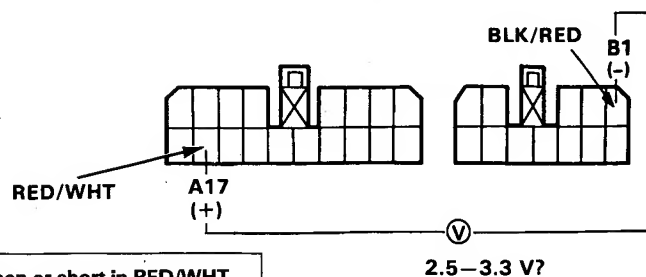
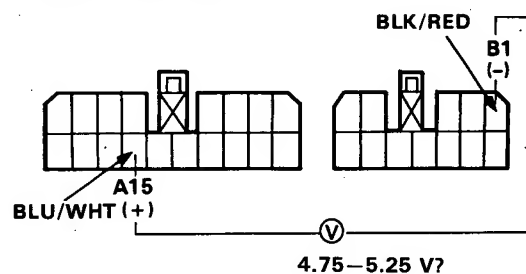
Turn the ignition switch ON.

Measure the voltage between the A17 (RED/WHT) and B1 (BLK/RED) terminals.



YES  
Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

View from wire side.



(cont'd)

# Electrical Troubleshooting

## Troubleshooting Flowchart (cont'd)

**S3** indicator light does not come on with the ignition switch ON (it should come on for about 2 seconds).

Disconnect the 12P connector from the TCM.

Check for continuity between the B1 (BLK/RED) terminal and body ground, and between the B6 (BRN/BLK) terminal and body ground.

Is there continuity?

NO

Repair open in BLK/RED wire between the B1 terminal and G401 and/or between the B6 terminal and G401.

YES

Turn the ignition switch ON.

Measure the voltage between the B2 (BLK/YEL) and B1 (BLK/RED) terminals, and between the B7 (BLK/YEL) and B1 terminals.

Is there battery voltage?

NO

Repair open or short in BLK/YEL wire between the B2/B7 terminal and the dash fuse box.

YES

Turn the ignition switch OFF.

Measure the resistance between the B11 (GRN) and B1 (BLK/RED) terminals.

Is the resistance more than 100  $\Omega$ ?

NO

Repair short in GRN wire between the B11 terminal and the gauge assembly.

YES

Connect the 12P connector to the TCM.

Turn the ignition switch ON. Be sure that the voltage is available for 2 seconds between the B11 (GRN) terminal and B1 (BLK/RED) terminals.

Is the voltage 6-12 V?

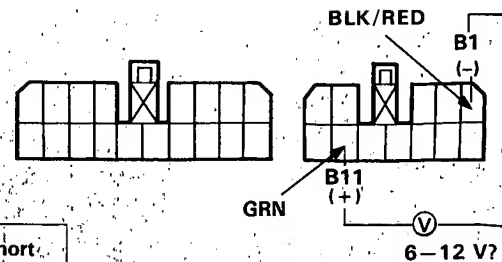
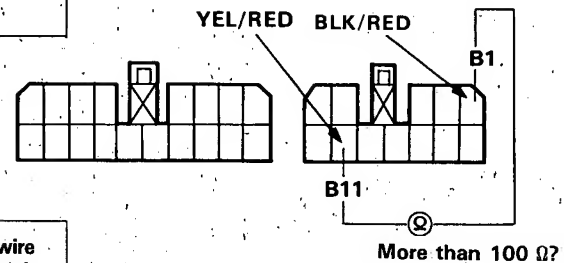
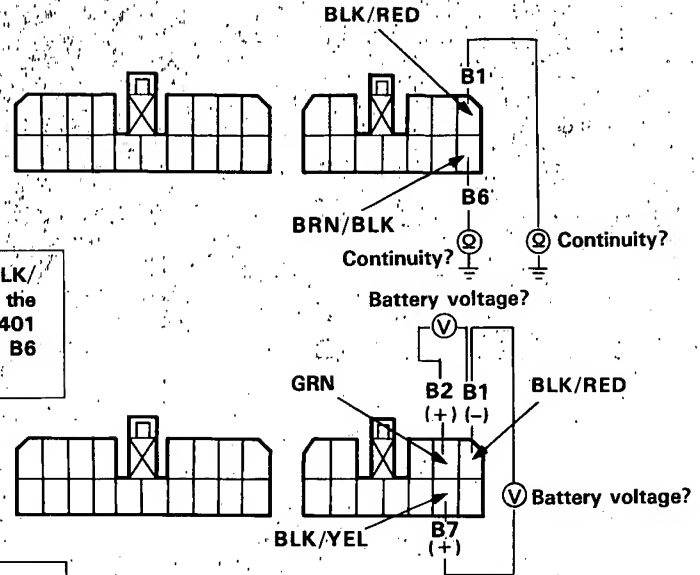
YES

Check for open or short in GRN wire between the B11 terminal and the gauge assembly. If wire is OK, check the **S3** Indicator Light Bulb and the A/T gear position indicator circuit.

NO

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

View from wire side.



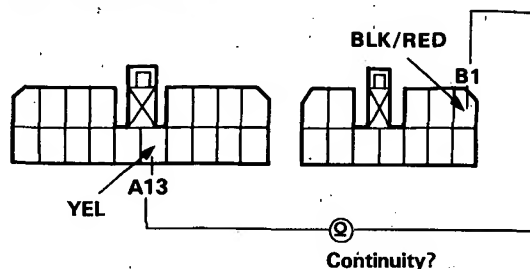


**S<sub>4</sub> won't engage.**

Disconnect the 18P and 12P connectors from the TCM.

Check for continuity between the A13 (YEL) and B1 (BLK/RED) terminals.

View from wire side.



Is there continuity?

YES

Check for short in YEL wire between the A13 terminal and the S<sub>4</sub> switch. If wire is OK, check the S<sub>4</sub> Switch (page 14-58).

NO

Check for continuity between the A13 (YEL) and B1 (BLK/RED) terminals while pressing the S<sub>4</sub> switch.

Is there continuity?

NO

Check for open in YEL wire between the A13 terminal and the S<sub>4</sub> switch. If wire is OK, check the S<sub>4</sub> Switch (page 14-58).

YES

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

(cont'd)

# Electrical Troubleshooting

## Troubleshooting Flowchart (cont'd)

Fails to shift from 2nd to first on releasing the brake pedal when stopped in **D** or **S**.

Depress the brake pedal and check that the brake lights come on.

Do the lights come on?

NO

Repair the Brake Light Circuit (see section 23).

YES

Disconnect the 18P and 12P connectors from the TCM.

Depress the brake pedal.

Measure the voltage between the A12 (GRN/WHT) and B1 (BLK/RED) terminals.

Is there battery voltage?

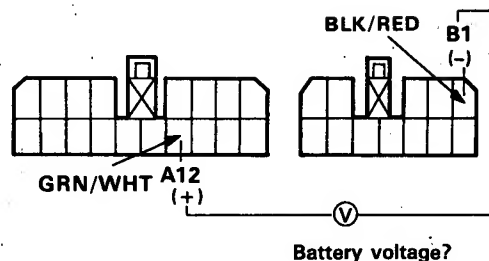
NO

Repair open in GRN/WHT wire between the A12 and the brake switch.

YES

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

View from wire side.





Inspection of the shift-lock switch signal.

Depress the brake pedal and listen for a clicking noise from the shift-lock solenoid.

Is solenoid operating properly?

NO

- Repair the shift-lock solenoid circuit (see section 23).
- Check solenoid operation (see section 23).

YES

Turn the ignition switch OFF.

Disconnect the 18P and 12P connectors from the TCM.

Turn the ignition switch ON.

Depress the brake pedal and accelerator pedal simultaneously and measure voltage between the A8 (WHT/RED) and B1 (BLK/RED) terminals.

Is there voltage ?

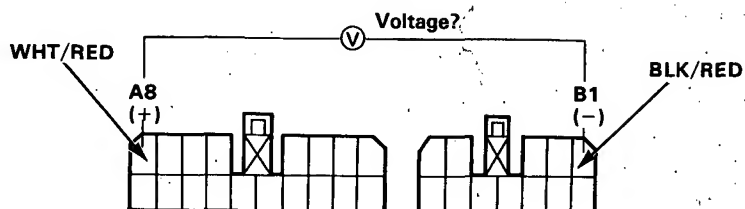
YES

Check for loose TCM connectors. If necessary, substitute a known-good TCM and recheck.

NO

Shift-lock switch signal is OK.

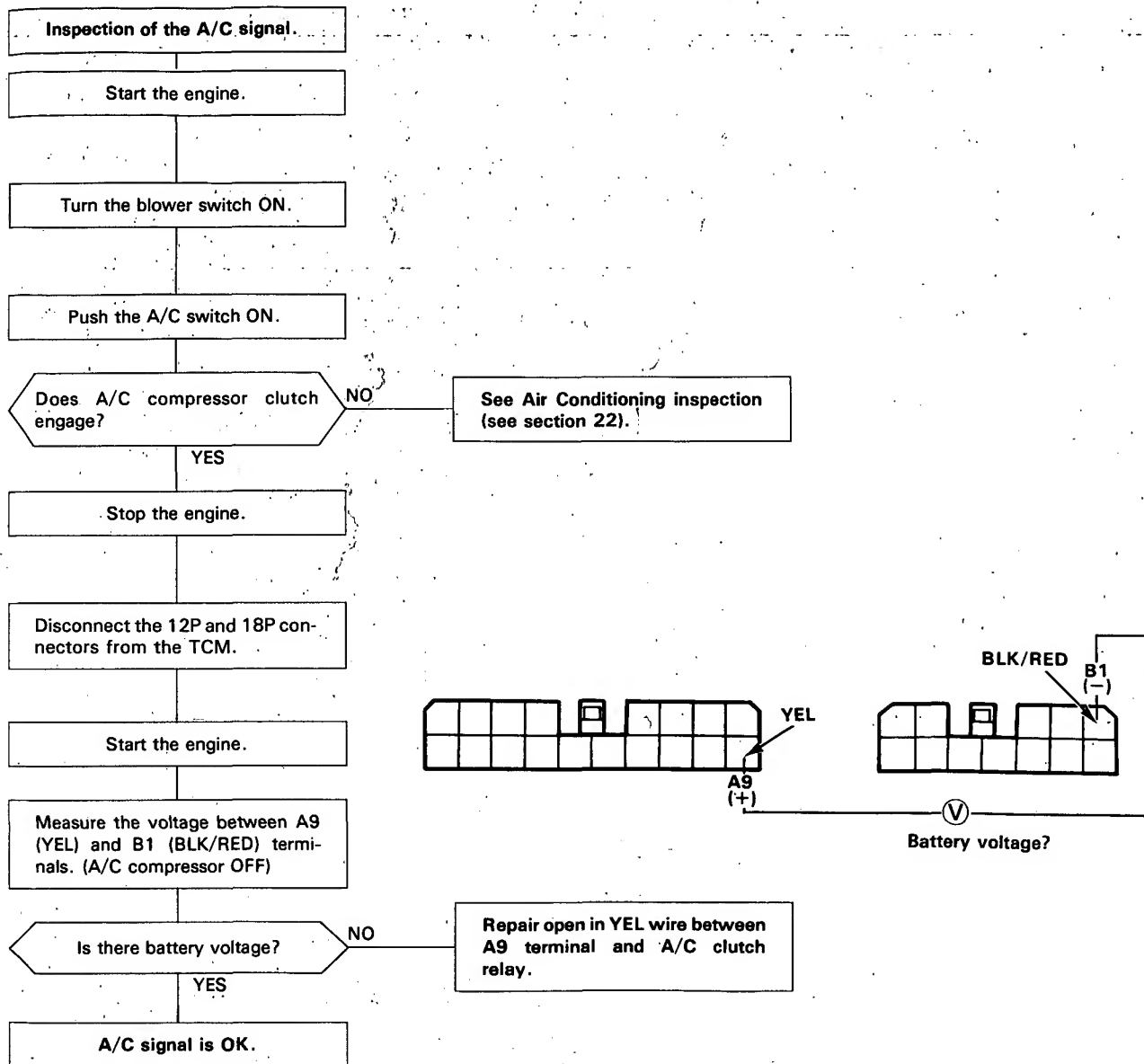
View from wire side.



(cont'd)

# Electrical Troubleshooting

## Troubleshooting Flowchart (cont'd)





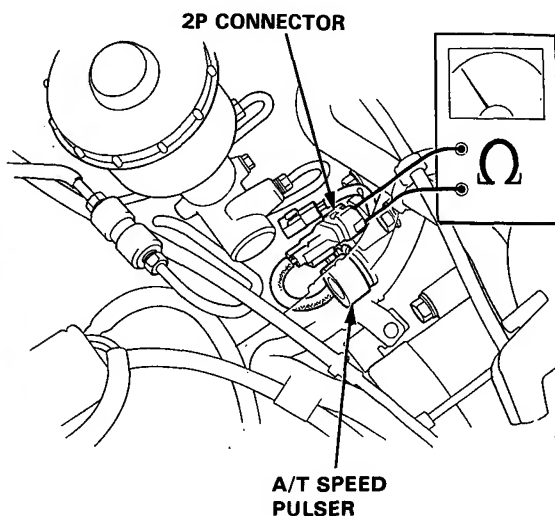
# A/T Speed Pulser

## Test

### ⚠ WARNING

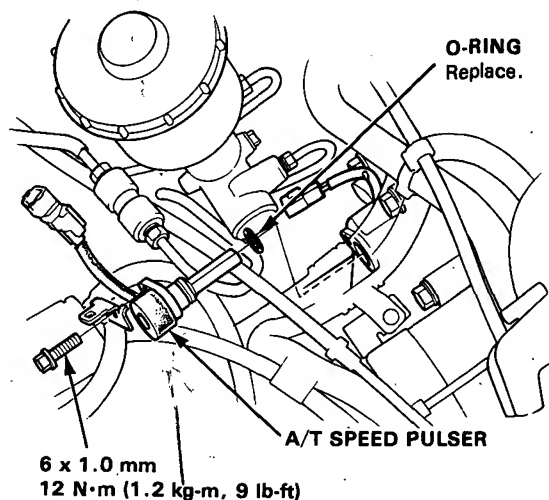
- Set the parking brake securely and block the rear wheels.
- Make sure jacks and safety stands are placed properly.

1. Jack up the front of the car and support with safety stands.
2. Disconnect the A/T speed pulser 2P connector.
3. Rotate the front wheels and be sure that continuity and no continuity appear alternately between the two terminals.

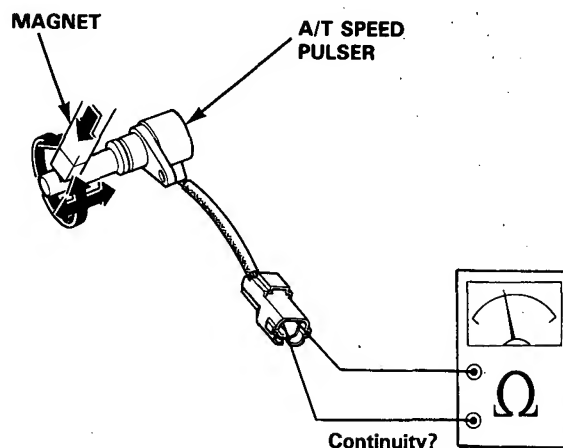


## Removal/Inspection

1. Remove the 6 mm bolt from the transmission housing and remove the A/T speed pulser.



2. Bring a magnet close to the A/T speed pulser and check for continuity.



A/T speed pulser is in good condition if there is:

- Continuity with a magnet close to the pulser.
- No continuity with a magnet away from the pulser.

If the A/T speed pulser is normal, go to Rotor Disassembly/Inspection/Reassembly (see page 14-101).

3. Replace the O-ring with a new one before reassembling the A/T speed pulser.

**CAUTION:** Carefully inspect the A/T speed pulser before installing. Do not install if it shows signs of being dropped or improperly handled.

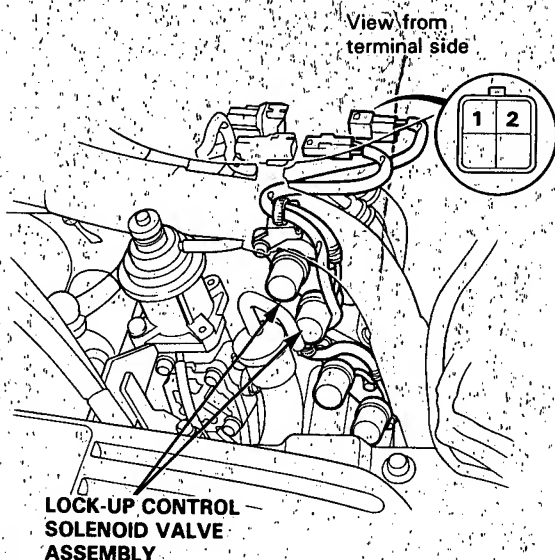
# Lock-up Control Solenoid Valve A/B

## Test

NOTE: Lock-up control solenoid valves A and B must be removed/replaced as an assembly.

1. Disconnect the connector from the lock-up control solenoid valve assembly.
2. Measure the resistance between the No. 1 terminal (solenoid valve A) of the lock-up control solenoid valve connector, and body ground and between the No. 2 terminal (solenoid valve B) and body ground.

STANDARD: 12–24  $\Omega$



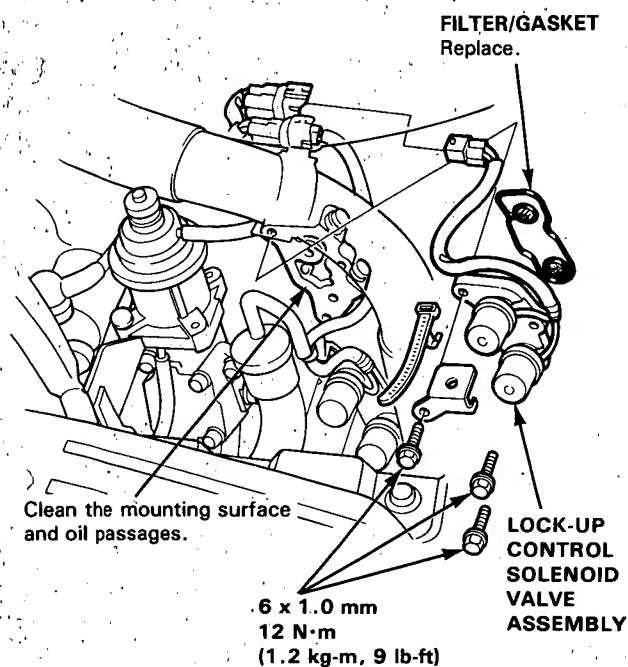
3. Replace the lock-up control solenoid valve assembly if the resistance is out of specification.
4. If the resistance is within the standard, connect the No. 1 terminal of the lock-up control solenoid valve connector to the battery positive terminal. A clicking sound should be heard. Connect the No. 2 terminal to the battery positive terminal. A clicking sound should be heard. Replace the lock-up control solenoid valve assembly if no clicking sound is heard.

## Replacement

1. Remove the mounting bolts and lock-up control solenoid valve assembly.

NOTE: Be sure to remove or replace the lock-up control solenoid valves A and B as an assembly.

2. Check the lock-up control solenoid valve oil passages for dust or dirt, and replace as an assembly, if necessary.



3. Clean the mounting surface and oil passages of the lock-up control solenoid valve assembly and install a new filter/gasket.
4. Check the connector for rust, dirt or oil and reconnect it securely.



# Shift Control Solenoid Valve A/B

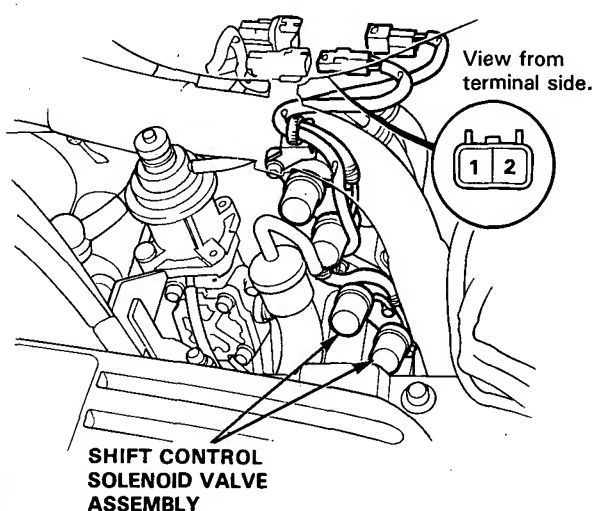


## Test

**NOTE:** Shift control solenoid valves A and B must be removed/replaced as an assembly.

1. Disconnect the connector from the shift control solenoid valve assembly.
2. Measure the resistance between the No. 1 terminal (solenoid valve A) of the shift control solenoid valve connector, and body ground and between the No. 2 terminal (solenoid valve B) and body ground.

**STANDARD:** 12–24  $\Omega$



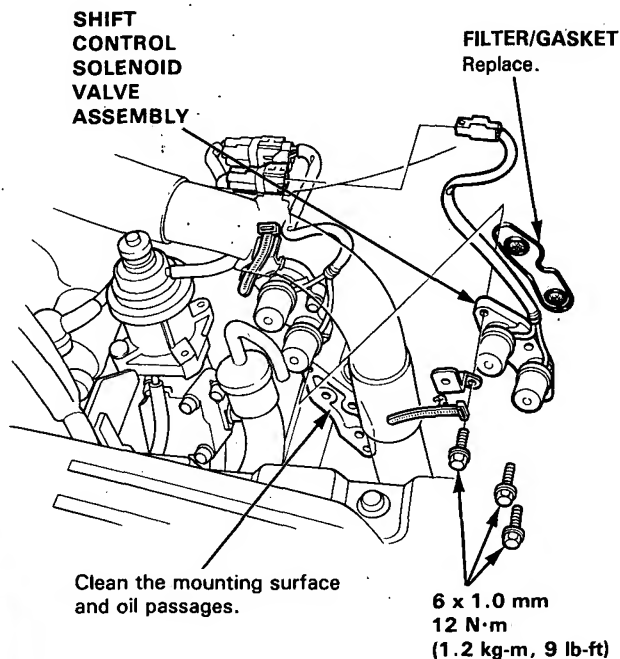
3. Replace the shift control solenoid valve assembly if the resistance is out of specification.
4. If the resistance is within standard, connect the No. 1 terminal of the shift control solenoid valve connector to the battery positive terminal. A clicking sound should be heard. Connect the No. 2 terminal to the battery positive terminal. A clicking sound should be heard. Replace the shift control solenoid valve assembly if no clicking sound is heard.

## Replacement

1. Remove the mounting bolts and shift control solenoid valve assembly.

**NOTE:** Be sure to remove or replace the shift control solenoid valves A and B as an assembly.

2. Check the shift control solenoid valve oil passages for dust or dirt, and replace as an assembly, if necessary.

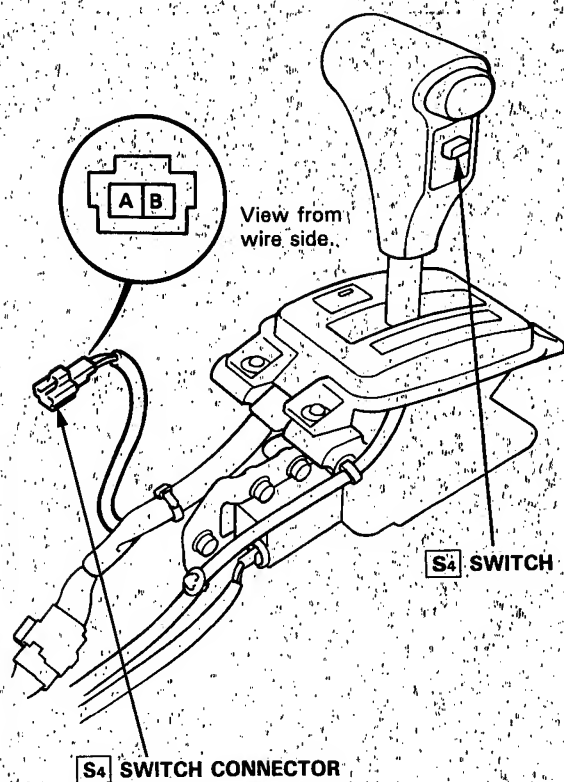


3. Clean the mounting surface and oil passages of the shift control solenoid valve assembly and install a new filter/gasket.
4. Check the connector for rust, dirt or oil and reconnect it securely.

## S<sub>4</sub> Switch

### Test

1. Remove the front console (see section 20).
2. Disconnect the **S<sub>4</sub>** switch connector.
3. Check for continuity between A and B terminals. There should be continuity when the switch is pressed.





# Hydraulic System

## Symptom-to-Component Chart

SYMPTOM	Check these items on the PROBABLE CAUSE LIST	Check these items on the NOTES CHART
Engine runs, but car does not move in any gear.	1, 6, 7, 16	K, L, R, S
Car moves in <b>[R]</b> and <b>[2]</b> but not in <b>[S]</b> or <b>[D]</b> .	8, 29, 44, 48	C, M, O
Car moves in <b>[S]</b> , <b>[D]</b> , <b>[R]</b> , but not in <b>[2]</b> .	9, 30, 49	C, L
Car moves in <b>[S]</b> , <b>[D]</b> , <b>[2]</b> , but not in <b>[R]</b> .	1, 11, 22, 34, 38, 39, 40	C, L, Q
Car moves in <b>[N]</b> .	1, 8, 9, 10, 11, 46, 47	C, D
Excessive idle vibration.	5, 17, 6, 36	B, K, L
Slips in all gears.	6, 7, 16	C, L
Slips in 1st gear.	8, 29, 44, 48	C, N, O
Slips in 2nd gear.	9, 20, 23, 30, 49	C, L
Slips in 3rd gear.	10, 21, 23, 31, 44	C, L
Slips in 4th gear.	11, 23, 32	C, L
Slips in reverse gear.	11, 32, 34	C
Flares on 1-2 upshift.	3, 15	E, L
Flares on 2-3 upshift.	3, 15, 24, 44	E, L
Flares on 3-4 upshift.	3, 15, 25, 44	E, L
No upshift, transmission stays in 1st gear.	14, 19, 23	G, L
No downshift to 1st gear.	19	G, L
Late upshift.	14	L
Erratic shifting.	2, 14, 26	
Harsh shift (up and down shifting).	2, 4, 15, 23, 24, 27, 47	A, E, H, I, L
Harsh shift (1-2).	2, 9	C, D
Harsh shift (2-3).	2, 10, 23, 24	C, D, H, L
Harsh shift (3-4).	2, 11, 23, 25	C, D, I, L
Harsh kick-down shifts.	2, 23, 27, 28	L, Q
Harsh kick-down shifts (2-1).	48	O
Harsh downshift at closed throttle.	15	E, T
Axle(s) slips out of transmission on turns.	43, 50	L, P, Q
Axle(s) stuck in transmission.	43	L, Q
Ratcheting noise when shifting into <b>[R]</b> .	6, 7, 38, 39, 40	K, L, Q
Loud popping noise when taking off in <b>[R]</b> .	38, 39, 40	L, Q
Ratcheting noise when shifting from <b>[R]</b> to <b>[P]</b> or from <b>[R]</b> to <b>[N]</b> .	38, 39, 40, 45	L, Q
Noise from transmission in all selector lever positions.	6, 17	K, L, Q
Noise from transmission only when wheels are rolling.	39, 42	L, Q
Gear whine, rpm related (pitch changes with shifts).	8, 41	K, L, Q
Gear whine, speed related (pitch changes with speed).	38, 42	L, Q
Transmission will not shift into 4th gear in <b>[S4]</b> or <b>[D]</b> .	1, 21, 28, 32	L
Lock-up clutch does not lock-up smoothly.	17, 36, 37	L
Lock-up clutch does not operate properly.	2, 3, 15, 18, 35, 36, 37	E, L
Transmission has multitude of problems shifting. At disassembly, large particles of metal are found on magnet.	43	L, Q



PROBABLE CAUSE	
1.	Shift cable broken/out of adjustment.
2.	Vacuum modulator assembly/vacuum tube damaged.
3.	Vacuum modulator assembly damaged/barometric pressure tube clogged.
4.	Wrong type ATF.
5.	Idle rpm too low/high.
6.	Oil pump worn or binding.
7.	Pressure regulator stuck.
8.	1st clutch defective.
9.	2nd clutch defective.
10.	3rd clutch defective.
11.	4th clutch defective.
14.	Modulator valve stuck.
15.	Vacuum modulator valve (Throttle valve B) stuck.
16.	ATF strainer clogged.
17.	Torque converter defective.
18.	Torque converter check valve stuck.
19.	1-2 shift valve stuck.
20.	2-3 shift valve stuck.
21.	3-4 shift valve stuck.
22.	Servo control valve stuck.
23.	Clutch pressure control (CPC) valve stuck.
24.	2nd orifice control valve stuck.
25.	Orifice control valve stuck.
26.	3-2 kick-down valve stuck.
27.	3rd kick-down valve stuck.
28.	4th exhaust valve stuck.
29.	1st accumulator defective.
30.	2nd accumulator defective.
31.	3rd accumulator defective.
32.	4th accumulator defective.
34.	Servo valve stuck.
35.	Lock-up timing valve stuck.
36.	Lock-up shift valve stuck.
37.	Lock-up control valve stuck.
38.	Shift fork bent.
39.	Reverse gears worn/damaged (3 gears).
40.	Reverse selector worn.
41.	3rd gears worn/damaged (2 gears).
42.	Final gears worn/damaged (2 gears).
43.	Differential pinion shaft worn.
44.	Feedpipe O-ring broken.
45.	4th gears worn/damaged (2 gears).
46.	Gear clearance incorrect.
47.	Clutch clearance incorrect.
48.	Sprag clutch defective.
49.	Sealing rings/guide worn.
50.	Axle-inboard joint clip missing.

(cont'd)

# Hydraulic System

## Symptom-to-Component Chart (cont'd)

The following symptoms can be caused by improper repair or assembly.	Check these items on the PROBABLE CAUSE DUE TO IMPROPER REPAIR	Items on the NOTES CHART
Car creeps in <b>[N]</b> .	R1, R2	
Car does not move in <b>[S]</b> or <b>[D]</b> .	R4	
Transmission locks up in <b>[R]</b> .	R3, R12	
Excessive drag in transmission.	R6	R, K
Excessive vibration, rpm related.	R7	
Noise with wheels moving only.	R5	
Main seal pops out.	R8	S
Various shifting problems.	R9, R10	
Harsh upshifts.	R11	

PROBABLE CAUSE DUE TO IMPROPER REPAIR	
R1.	Improper clutch clearance.
R2.	Improper gear clearance.
R3.	Parking brake lever installed upside down.
R4.	Sprag clutch installed upside down.
R5.	Selector hub installed upside down.
R6.	Oil pump binding.
R7.	Torque converter not fully seated in oil pump.
R8.	Main seal improperly installed.
R9.	Springs improperly installed.
R10.	Valves improperly installed.
R11.	Ball check valves not installed.
R12.	Shift fork bolt not installed.



#### NOTES

A.	See flushing procedure, page 14-136.
B.	Set idle rpm in gear to specified idle speed. If still no good, adjust motor mounts as outlined in engine section of service manual.
C.	If the large clutch piston O-ring is broken, inspect the piston groove for rough machining.
D.	If the clutch pack is seized or is excessively worn, inspect the other clutches for wear and check the orifice control valves and throttle valves for free movement.
E.	If vacuum modulator valve (throttle valve B) is stuck, inspect the clutches for wear.
G.	If the 1-2 valve is stuck closed, the transmission will not upshift. If stuck open the transmission has no 1st gear.
H.	If the 2nd orifice control valve is stuck, inspect the 2nd and 3rd clutch packs for wear.
I.	If the orifice control valve is stuck, inspect the 3rd and 4th clutch packs for wear.
J.	If the clutch pressure control valve is stuck closed, the transmission will not shift out of 1st gear.
K.	Improper alignment of main valve body and torque converter housing may cause oil pump seizure. The symptoms are mostly an rpm-related ticking noise or high pitched squeak.
L.	If the ATF strainer is clogged with particles of steel or aluminum, inspect the oil pump and differential pinion shaft. If both are OK and no cause for the contamination is found, replace the torque converter.
M.	If the 1st clutch feedpipe guide in the right side cover is scored by the mainshaft, inspect the ball bearing for excessive movement in the transmission housing. If OK, replace the right side cover as it is dented. The O-ring under the guide is probably worn.
N.	Replace the mainshaft if the bushings for the 1st and 4th feedpipe are loose or damaged. If the 1st feedpipe is damaged or out of round, replace it. If the 4th feedpipe is damaged or out of round, replace the right side cover.
O.	A worn or damaged sprag clutch is mostly a result of shifting the transmission in <b>S</b> or <b>D</b> while the wheels rotate in reverse, such as rocking the car in snow.
P.	Inspect the frame for collision damage.
Q.	<p>Inspect for damage or wear:</p> <ol style="list-style-type: none"><li>1. Reverse selector gear teeth chamfers.</li><li>2. Engagement teeth chamfers of countershaft 4th and reverse gear.</li><li>3. Shift fork for scuff marks in center.</li><li>4. Differential pinion shaft for wear under pinion gears.</li><li>5. Bottom of 3rd clutch for swirl marks.</li></ol> <p>Replace items 1, 2, 3 and 4 if worn or damaged. If transmission makes clicking, grinding or whirring noise, also replace mainshaft 4th gear and reverse idler gear and countershaft 4th gear in addition to 1, 2, 3 or 4.</p> <p>If differential pinion shaft is worn, overhaul differential assembly and replace ATF strainer and thoroughly clean transmission, flush torque converter, cooler and lines.</p> <p>If bottom of 3rd clutch is swirled and transmission makes gear noise, replace the countershaft and final driven gear.</p>
R.	Be very careful not to damage the torque converter housing when replacing the main ball bearing. You may also damage the oil pump when you torque down the main valve body. This will result in oil pump seizure if not detected. Use proper tools.
S.	Install the main seal flush with the torque converter housing. If you push it into the torque converter housing until it bottoms out, it will block the oil return passage and result in damage.
T.	Harsh downshifts when coasting to a stop with zero throttle may be caused by a bent-in throttle valve retainer/cam stopper. Throttle cable adjustment may clear this problem.
U.	Check if servo valve stopper cap is installed. If it was not installed, the check valve may have been pushed out by hydraulic pressure causing a leak (internal) affecting all forward gears.
V.	Throttle cable adjustment is essential for proper operation of the transmission. Not only does it affect the shift points if misadjusted, but also the shift quality and lock-up clutch operation. A cable adjusted too long will result in throttle pressure being too low for the amount of engine torque input into the transmission and may cause clutch slippage. A cable adjusted too short will result in too high throttle pressures which may cause harsh shifts, erratic shifts and torque converter hunting.

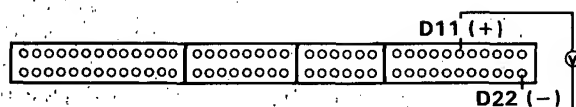
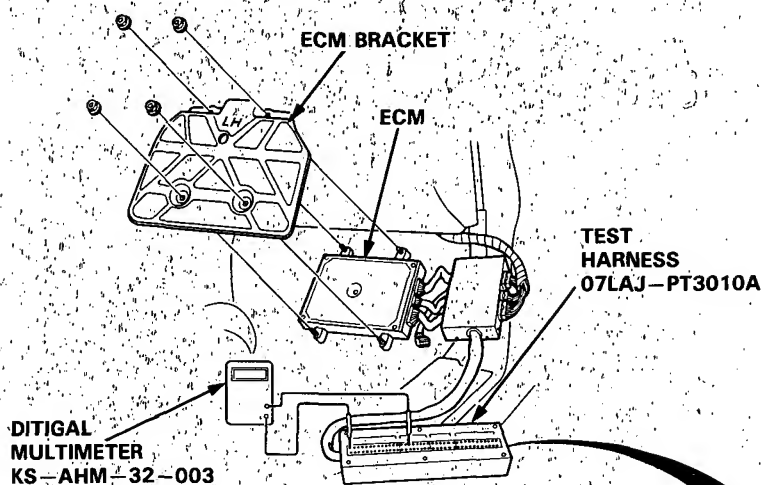
# Road Test

NOTE: Warm up the engine to normal operating temperature (the cooling fan comes on).

1. Apply parking brake and block the wheels. Start the engine, then move the selector lever to **[D]** position while depressing the brake pedal. Depress the accelerator pedal, and release it suddenly. Engine should not stall.
2. Repeat same test in **[S]** position.
3. Shift the selector lever to **[D]** position and check that the shift points occur at approximate speeds shown. Also check for abnormal noise and clutch slippage.

NOTE: Throttle position sensor voltage represents the throttle opening.

1. Connect the Test Harness between the ECM and connector (see section 11).
2. Set the digital multimeter to check voltage between D11 (+) terminal and D22 (-) terminal for the throttle position sensor.



## Upshift

### **[D]** Position

		1st → 2nd	2nd → 3rd	3rd → 4th	Lock-up Clutch ON
Throttle position sensor voltage: 0.76 V	mph	8-11	19.5-23	25-29.5	38-41
Coasting down-hill from a stop	km/h	12.9-17.7	31.4-37.0	40.2-47.5	61.1-66.0
Throttle position sensor voltage: 2.25 V	mph	17.5-21.5	35-40.5	55-61	64.5-68.5
Acceleration from a stop	km/h	28.2-34.6	56.3-65.2	88.5-98.1	103.8-110.2
Full-throttle	mph	32-37.5	64-72.5	103-114	86-91.5
Acceleration from a stop	km/h	51.5-60.3	103-116.7	165.8-183.5	138.4-147.2

### **[S]** Position (With S<sub>4</sub> switch in operation)

		1st → 2nd	2nd → 3rd	3rd → 4th	Lock-up Clutch ON
Throttle position sensor voltage: 0.76 V	mph	8-11	23.5-27	31.5-36	43-50
Coasting down-hill from a stop	km/h	12.9-17.7	37.8-43.5	50.7-57.9	69.2-80.5
Throttle position sensor voltage: 2.25 V	mph	17.5-21.5	41-46.5	67-73	73.5-77.5
Acceleration from a stop	km/h	28.2-34.6	66.0-74.8	107.8-117.5	118.3-124.7
Full-throttle	mph	32-37.5	64-72.5	103-114	86-91.5
Acceleration from a stop	km/h	51.5-60.3	103-116.7	165.8-183.5	138.4-147.2





● Downshift

**D** Position

Lock-up Clutch OFF    4th→3rd    3rd→2nd    2nd→1st

Throttle position sensor voltage: 0.76 V Coasting or braking to a stop	mph	34.5—38	—	17.5—21	6—9.5
	km/h	55.5—61.2	—	28.2—33.8	9.7—15.3
Throttle position sensor voltage: 2.25 V When car is slowed by increased grade, wind, etc.	mph	56.5—60.5	—	—	—
	km/h	90.9—97.4	—	—	—
Full-throttle When car is slowed by increased grade, wind, etc.	mph	84—89.5	83—93.5	55—62	27—32.5
	km/h	135.2—144.0	133.6—150.5	88.5—99.8	43.5—52.3

**S** Position (with S4 switch in operation)

Lock-up Clutch OFF    4th→3rd    3rd→2nd    2nd→1st

Throttle position sensor voltage: 0.76 V Coasting or braking to a stop	mph	42.5—46	—	17.5—21	6—9.5
	km/h	68.4—74.0	—	28.2—33.8	9.7—15.3
Throttle position sensor voltage: 2.25 V When car is slowed by increased grade, wind, etc.	mph	55.5—60.5	—	—	—
	km/h	89.3—97.4	—	—	—
Full-throttle When car is slowed by increased grade, wind, etc.	mph	84—89.5	83—93.5	55—62	27—32.5
	km/h	135.2—144.0	133.6—150.5	88.5—99.8	43.5—52.3

4. Accelerate to about 35 mph (56 km/h) so the transmission is in 4th, then shift from **D** to **2**. The car should immediately begin slowing down from engine braking.

**CAUTION:** Do not shift from **D** or **S** to **2** at speeds 63 mph (100 km/h); you may damage the transmission.

5. Check for abnormal noise and clutch slippage in the following positions.

**2** (2nd Gear) Position

- 1. Accelerate from a stop at full throttle. Check that there is no abnormal noise or clutch slippage.
- 2. Upshifts and downshifts should not occur with the selector in this position.

**R** (Reverse) Position

Accelerate from a stop at full throttle, and check for abnormal noise and clutch slippage.

6. Test in **P** (Parking) Position

Park car on slope (approx. 16°), apply the parking brake, and shift into **P** position. Release the brake; the car should not move.

# Stall Speed

## Test

### CAUTION

- To prevent transmission damage, do not test stall speed for more than 10 seconds at a time.
- Do not shift the lever while raising the engine speed.
- Be sure to remove the pressure gauge before testing stall speed.

1. Engage parking brake and block all four wheels.
2. Connect tachometer, and start the engine.
3. Make sure the A/C switch is OFF.
4. After the engine has warmed up to normal operating temperature (the cooling fan comes on), shift into **[2]** position.
5. Fully depress the brake pedal and accelerator for 6 to 8 seconds, and note engine speed.
6. Allow 2 minutes for cooling, then repeat the test in **[D]**, **[S]**, and **[R]** position.

### NOTE:

- Stall speed tests should be used for diagnostic purposes only.
- Stall speed should be the same in **[2]**, **[S]**, **[D]**, and **[R]** position.

### Stall Speed RPM:

Specification: 2,600 rpm

Service Limit: 2,450–2,750 rpm

TROUBLE	PROBABLE CAUSE
Stall rpm high in <b>[D]</b> , <b>[S]</b> , <b>[2]</b> & <b>[R]</b>	<ul style="list-style-type: none"><li>• Low fluid level or oil pump output.</li><li>• Clogged ATF strainer.</li><li>• Pressure regulator valve stuck closed.</li><li>• Slipping clutch.</li></ul>
Stall rpm high in <b>[R]</b>	<ul style="list-style-type: none"><li>• Slippage of 4th clutch</li></ul>
Stall rpm high in <b>[2]</b>	<ul style="list-style-type: none"><li>• Slippage of 2nd clutch</li></ul>
Stall rpm high in <b>[D]</b> & <b>[S]</b>	<ul style="list-style-type: none"><li>• Slippage of 1st clutch or 1st gear one-way clutch</li></ul>
Stall rpm low in <b>[D]</b> , <b>[S]</b> , <b>[2]</b> & <b>[R]</b>	<ul style="list-style-type: none"><li>• Engine output low</li><li>• Torque converter one-way clutch slipping</li></ul>



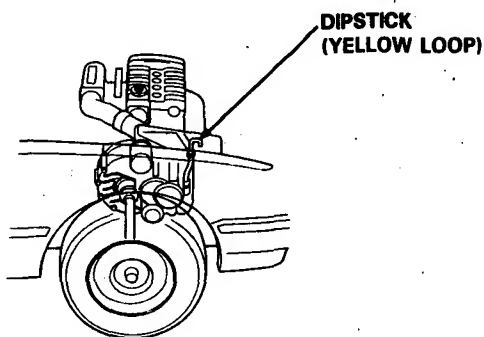
# Fluid Level

## Checking/Changing

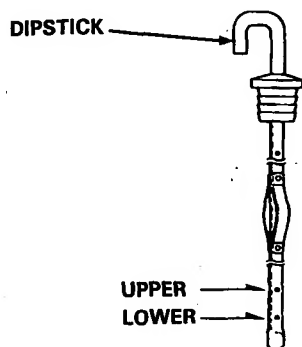
### Checking

**NOTE:** Check the fluid level with the engine at normal operating temperature (the cooling fan comes on).

1. Park the car on level ground. Shut off the engine.
2. Remove the dipstick (yellow loop) from the transmission, and wipe it with a clean cloth.
3. Insert the dipstick into the transmission.



4. Remove the dipstick, and check the fluid level. It should be between the upper and lower marks.



5. If the level is below the lower mark, add fluid into the tube to bring it to the upper mark. Use Honda Premium Formula Automatic Transmission Fluid or an equivalent DEXRON® II Automatic Transmission Fluid (ATF) only.
6. Insert the dipstick back into the transmission.

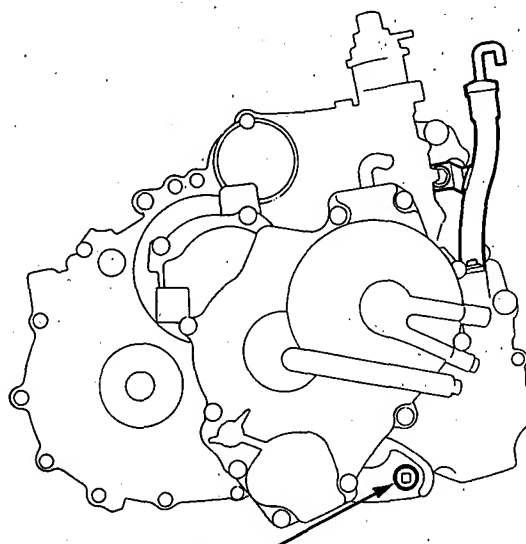
### Changing

1. Bring the transmission up to operating temperature by driving the car. Park the car on level ground, turn the engine off, and then remove the drain plug.

**NOTE:** If a cooler flusher is to be used, see page 14-136 and 137.

2. Reinstall the drain plug with a new washer, then refill transmission to the upper mark on the dipstick.

**Automatic Transmission Fluid Capacity:**  
3.0 l (3.2 US qt. 2.6 Imp. qt) at change  
6.3 l (6.7 US qt. 5.5 Imp. qt) after overhaul



14 x 1.5 mm  
40 N·m (4.0 kg-m, 29 lb-ft)

# Pressure Testing

## ▲ WARNING

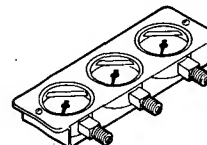
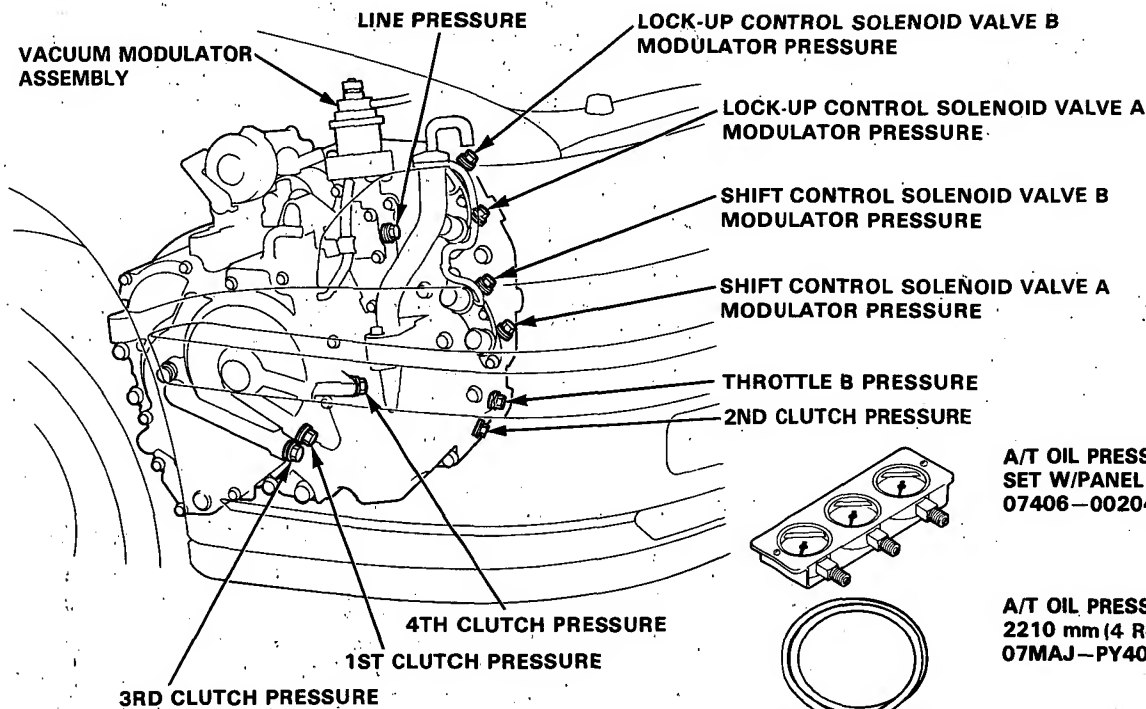
- Make sure jacks and safety stands are placed properly (see section 1).
- While testing, be careful of rotating front wheels.

## CAUTION:

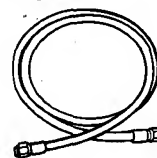
- Before testing, be sure the transmission is filled to the proper level.
- Connect an oil pressure gauge securely, being sure not to allow dust and other foreign particles to enter the inspection hole.
- Warm up the engine before testing.
- Set the parking brake securely, and block both rear wheels.
- Raise the front of the car and support with safety stands (see section 1).

## NOTE:

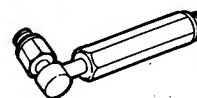
- Do not reuse old aluminum washers. Install the sealing bolt in the inspection hole and tighten to the specified torque 18 N·m (1.8 kg-m, 12 lb-ft).
1. Stop the engine and connect a tachometer.
  2. Connect an oil pressure gauge to each inspection hole.
  3. Start the engine and measure respective pressures as follows.



A/T OIL PRESSURE GAUGE  
SET W/PANEL  
07406-0020400



A/T OIL PRESSURE HOSE,  
2210 mm (4 Required)  
07MAJ-PY4011A

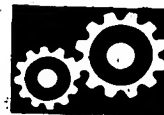


A/T OIL PRESSURE HOSE  
ADAPTER (4 Required)  
07MAJ-PY40120

## Throttle B Pressure Measurement

1. Set the parking brake securely, and block both rear wheels.
2. Raise the front of the car and support with safety stands.
3. Allow the front wheels to rotate freely.
4. Run the engine at 2,000 rpm.
5. Connect a vacuum pump to the manifold vacuum tube of the vacuum modulator assembly, and apply a vacuum of 500–600 mmHg (19.7–23.6 inHg).

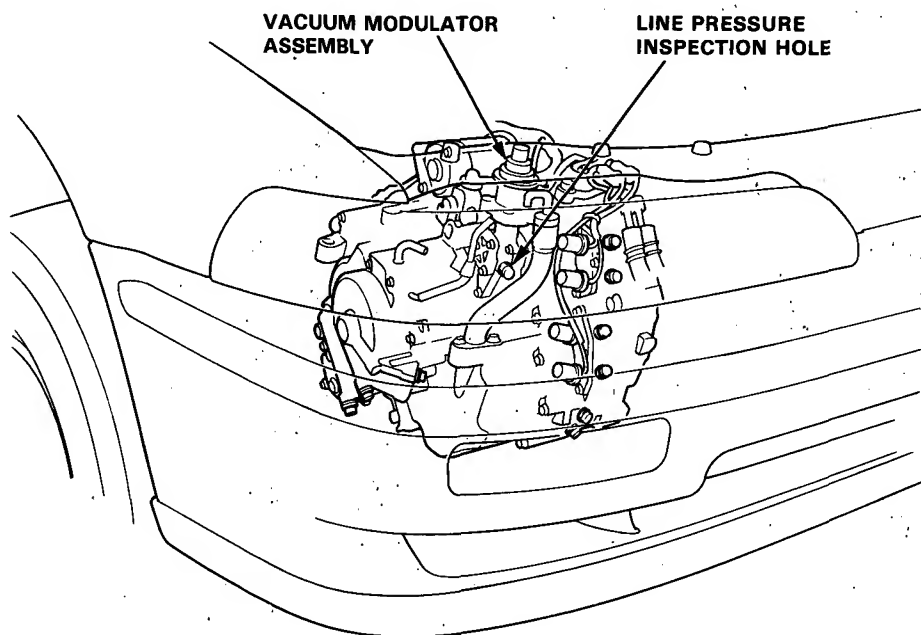
PRESSURE	SELECTOR POSITION	VACUUM MODULATOR TUBE	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi)	
					Standard	Service Limit
Throttle B	S or D	Vacuum of 500–600 mmHg (19.7–23.6 inHg)	Pressure too high	Faulty vacuum tube or damaged modulator valve diaphragm	0	—
		Vacuum of 0	No or low pressure	Faulty vacuum modulator valve	780–830 (7.8–8.3, 111–118)	730 (7.3, 104)



### Line Pressure Measurement

- 1. Set the parking brake and block both rear wheels securely.
- 2. Raise the front of the car and support with safety stands.
- 3. Run the engine at 2,000 rpm.
- 4. Connect a vacuum pump to the manifold vacuum tube of the vacuum modulator assembly; and apply a vacuum of 500–600 mmHg (19.7–23.6 inHg).
- 5. Measure the line pressure (under condition equivalent to throttle valve full close).
- 6. Disconnect the vacuum tube from the vacuum modulator valve.
- 7. Measure the line pressure (under condition equivalent to throttle valve full open).

NOTE: Before testing, be sure that the throttle B pressure is held within the specified limits.



PRESSURE	SELECTOR POSITION	VACUUM MODULATOR TUBE	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi)	
					Standard	Service Limit
Line	N or P	Vacuum of 500–600 mmHg (19.7–23.6 inHg)	Excessive LINE pressure	Faulty vacuum modulator valve or stuck regulator valve	500–600 (5.0–6.0, 71–85)	450 (4.5, 64)
		Vacuum of 0	No or low LINE pressure	Torque converter, oil pump, pressure regulator, torque converter check valve, vacuum modulator valve, lack of ATF, clogged strainer	780–830 (7.8–8.3, 111–118)	730 (7.3, 104)

NOTE: Higher pressures may be indicated if measurements are made in selector positions other than N or P.

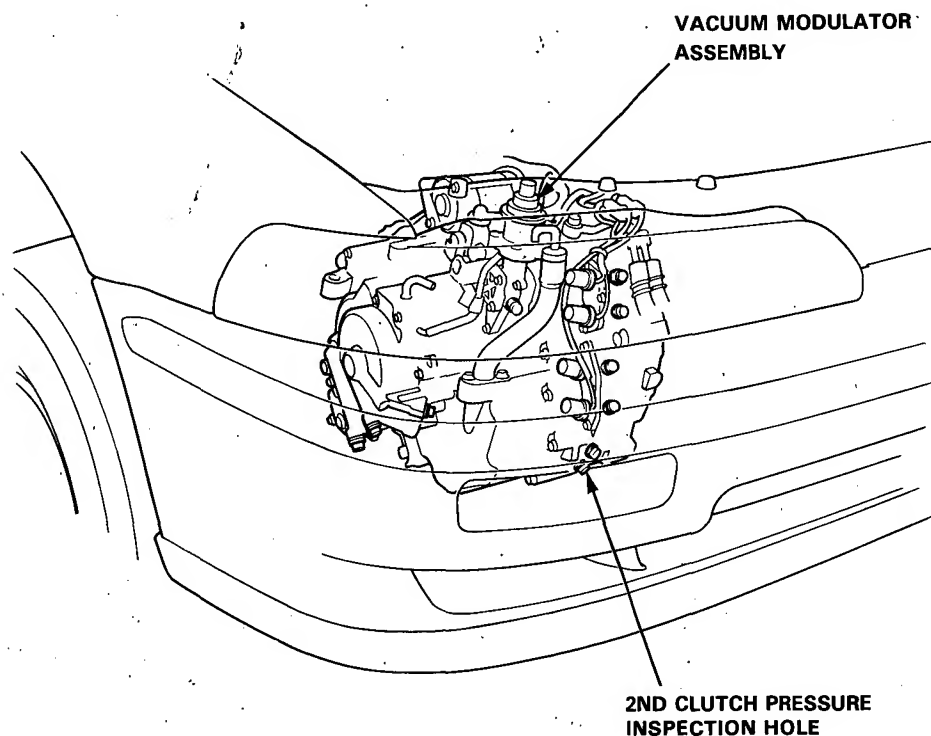
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# Pressure Testing

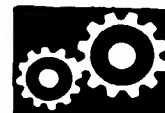
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## 2nd Clutch Pressure Measurement in **2** position

- 1. Set the parking brake and block both rear wheels securely.
  - 2. Raise the front of the car and support with safety stands.
  - 3. Allow the front wheel to rotate freely.
  - 4. Run the engine at 2,000 rpm.
  - 5. Connect a vacuum pump to the manifold vacuum tube of the vacuum modulator assembly, and apply a vacuum of 500–600 mmHg (19.7–23.6 inHg).
  - 6. Measure the 2nd clutch pressure (under condition equivalent to throttle valve full close).
  - 7. Disconnect the vacuum tube from the vacuum modulator valve.
  - 8. Measure the 2nd clutch pressure (under condition equivalent to throttle valve full open).
- NOTE: Before testing, be sure that the vacuum modulator pressure is held within the specified limits.

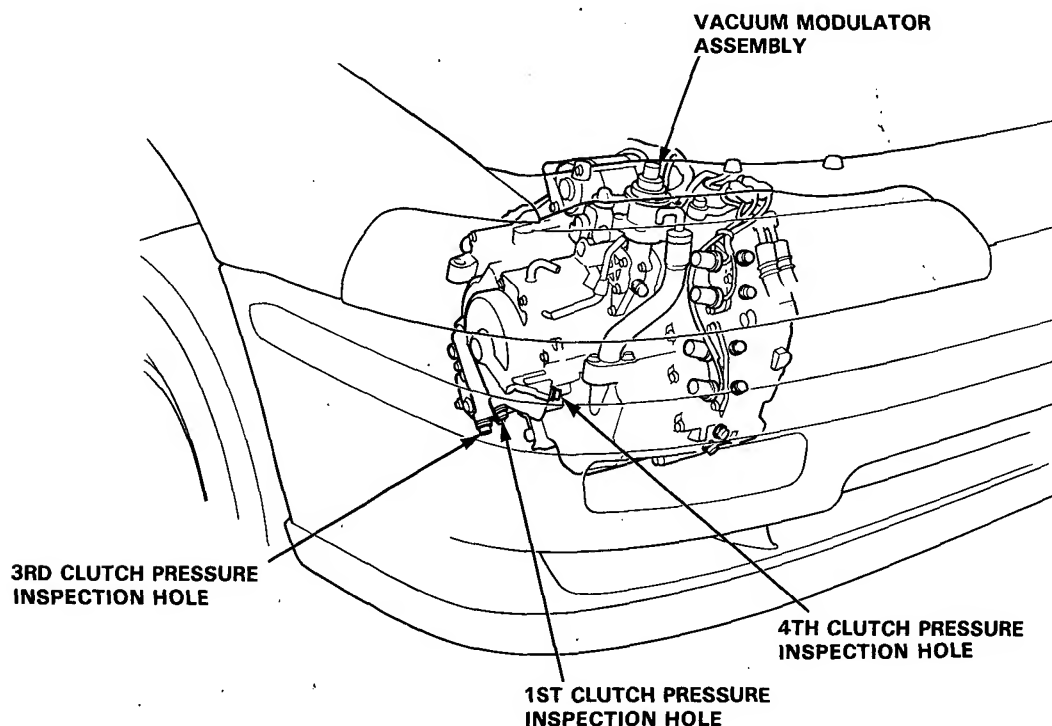


PRESSURE	SELECTOR POSITION	VACUUM MODULATOR TUBE	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi)	
					Standard	service Limit
2nd Clutch	<b>2</b>	Vacuum of 500–600 mmHg (19.7–23.6 inHg)	No or low 2nd pressure	Faulty 2nd clutch	780–880 (7.8–8.8, 111–125)	730 (7.3, 104)
		Vacuum of 0	No or low 2nd pressure	Faulty 2nd clutch	1090–1140 (10.9–11.4, 155–162)	1040 (10.4, 148)



### 1st, 3rd and 4th Clutch Pressure Measurement in **S**, **D**, and **R** position

- 1. Set the parking brake and block both rear wheels securely.
  - 2. Raise the front of the car and support with safety stands.
  - 3. Allow the front wheels to rotate freely.
  - 4. Run the engine at 2,000 rpm.
  - 5. Connect a vacuum pump to the manifold vacuum tube of the vacuum modulator assembly, and apply a vacuum of 500–600 mmHg (19.7–23.6 inHg).
  - 6. Measure each clutch pressure (under condition equivalent to throttle valve full close).
  - 7. Disconnect the vacuum tube from the vacuum modulator valve.
  - 8. Measure each clutch pressure (under condition equivalent to throttle valve full open).
- NOTE: Before testing, be sure the throttle B pressure is held within the specified limits.



PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi)	
				Standard	Service Limit
1st Clutch	<b>S</b> or <b>D</b>	No or low 1st pressure	Faulty 1st clutch or O-ring	500–600 (5.0–6.0, 71–85) ↓ Vacuum of 500–600 mmHg (19.7–23.6 inHg)	450 (4.5, 64) ↓ Vacuum of 500–600 mmHg (19.7–23.6 inHg)
3rd Clutch	<b>S</b> (S4 switch OFF)	No or low 3rd pressure	Faulty 3rd clutch or O-ring	790–840 (7.9–8.4, 112–119) ↓	740 (7.4, 105) ↓ Vacuum of 0
4th Clutch	<b>S</b> (S4 switch ON) or <b>D</b>	No or low 4th pressure	Faulty 4th clutch or O-ring		
4th Clutch	<b>R</b>	No or low 4th pressure	Faulty servo valve, 4th clutch or O-ring	Vacuum of 0	

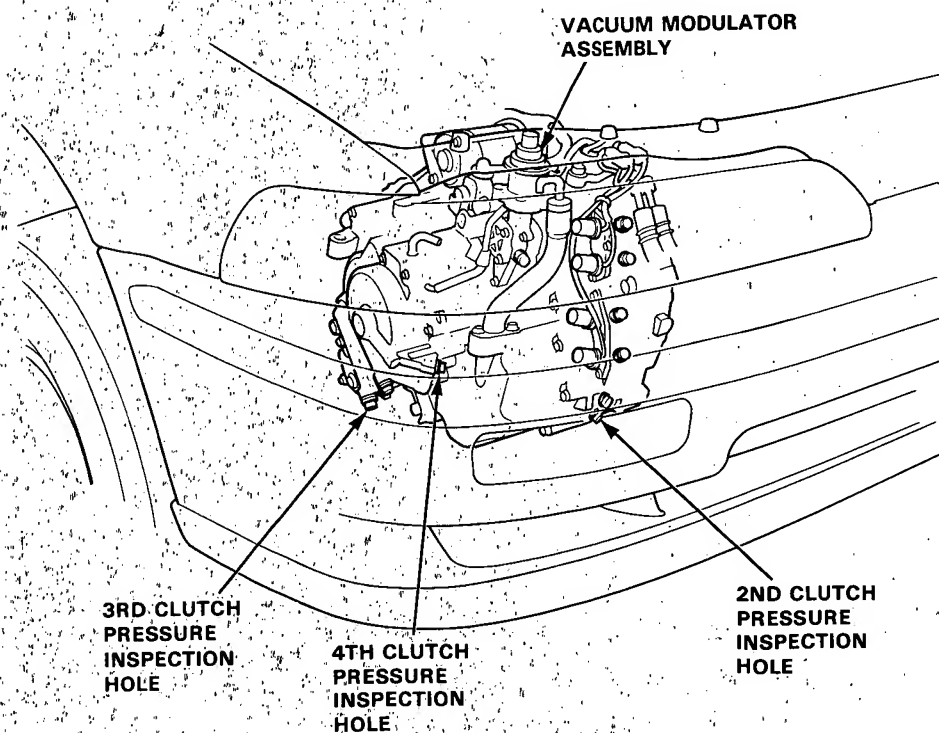
(cont'd)

# Pressure Testing

(cont'd)

## Clutch Low/High Pressure Measurement

1. Set the parking brake securely and block the rear wheels.
2. Raise the front of the car and support with safety stands.
3. Attach the gauge set to the 2nd, 3rd, and 4th clutch pressure inspection holes.
4. Connect the manifold vacuum tube of the vacuum modulator assembly.  
NOTE: Before connecting the vacuum tube, check that the throttle pressure B is normal, and the vacuum tube is not damaged and in good shape.
5. Start the engine and warm it up to normal operating temperature (the cooling fan comes on).
6. With the engine idling, move the selector lever to **S** or **D** position.
7. Slowly move the throttle linkage to increase engine rpm until pressure is indicated on the appropriate gauge. Then release the throttle linkage, allowing the engine to return to an idle, and record the pressure reading.  
NOTE: Record the pressure reading before the pressure indicated on the gauge reads naught (0) if the transmission shifts down.
8. Repeat step 7 for each clutch pressure being inspected (pressure when the throttle pressure B is naught (0)).
9. With the engine idling, disconnect the manifold vacuum tube. Increase the engine rpm until pressure is indicated on the appropriate gauge. Record the highest pressure reading obtained.  
NOTE: Do not increase the engine rpm excessively when measuring 3rd clutch pressure in **S** position (with the S4 switch in OFF or when measuring 4th clutch pressure in **D** position.) The transmission will not shift up in these positions regardless of speed of the engine.
10. Repeat step 9 for each clutch pressure being inspected (pressure when the throttle is fully open).  
NOTE: The clutches are normal if the pressures measured are held within the limits.



PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi)	
				Standard	Service Limit
2nd Clutch	<b>S</b> or <b>D</b>	No or low 2nd pressure	2nd clutch O-ring	500–840 (5.0–8.4, 71–119) (Variable engine throttle valve opening)	450–730 (4.5–7.3, 64–104) (Variable engine throttle valve opening)
3rd Clutch	<b>S</b> (S4 switch OFF)	No or low 3rd pressure	3rd Clutch O-ring		
4th Clutch	<b>S</b> (S4 switch ON) or <b>D</b>	No or low 4th pressure	4th Clutch O-ring		

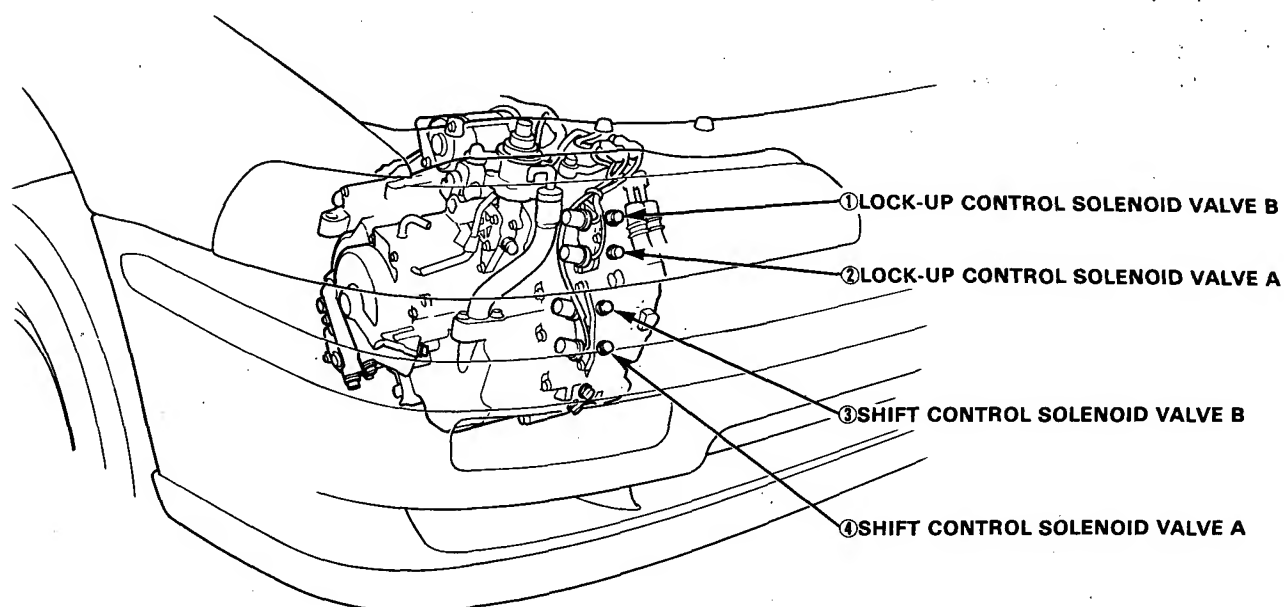




# Solenoid Valve Pressure Test

- 1. Set the parking brake securely.
- 2. Start the engine and run in at 2,000 rpm.
- 3. Measure pressure at each of the 4 ports shown below.

NOTE: Before testing, be sure that the line pressure is held within the specified limits.



PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi)	
				Standard	Service Limit
Modulator pressure	N or P	No or low (On 1 to 3 ports) pressure	① Lock-up Control Solenoid Valve B. ② Lock-up Control Solenoid Valve A. ③ Shift Control Solenoid Valve B. ④ Shift Control Solenoid Valve A.	520—560 (5.2—5.6, 74—80)	441 (4.5, 64)
		All 4 ports low	Modulator Valve		
		High pressure	Modulator Valve		

# Transmission

## Removal

### ⚠ WARNING

- Make sure jacks and safety stands are placed properly, and hoist brackets are attached to correct positions on the engine (see section 1).
- Apply parking brake and block rear wheels so car will not roll off stands and fall on you while working under it.

**CAUTION:** Use fender covers to avoid damaging painted surfaces.

**NOTE:** The radio may have a coded theft protection circuit. Be sure to get the code number before

- disconnecting the battery.
- removing the No. 14 (15 A) fuse.
- removing the radio.

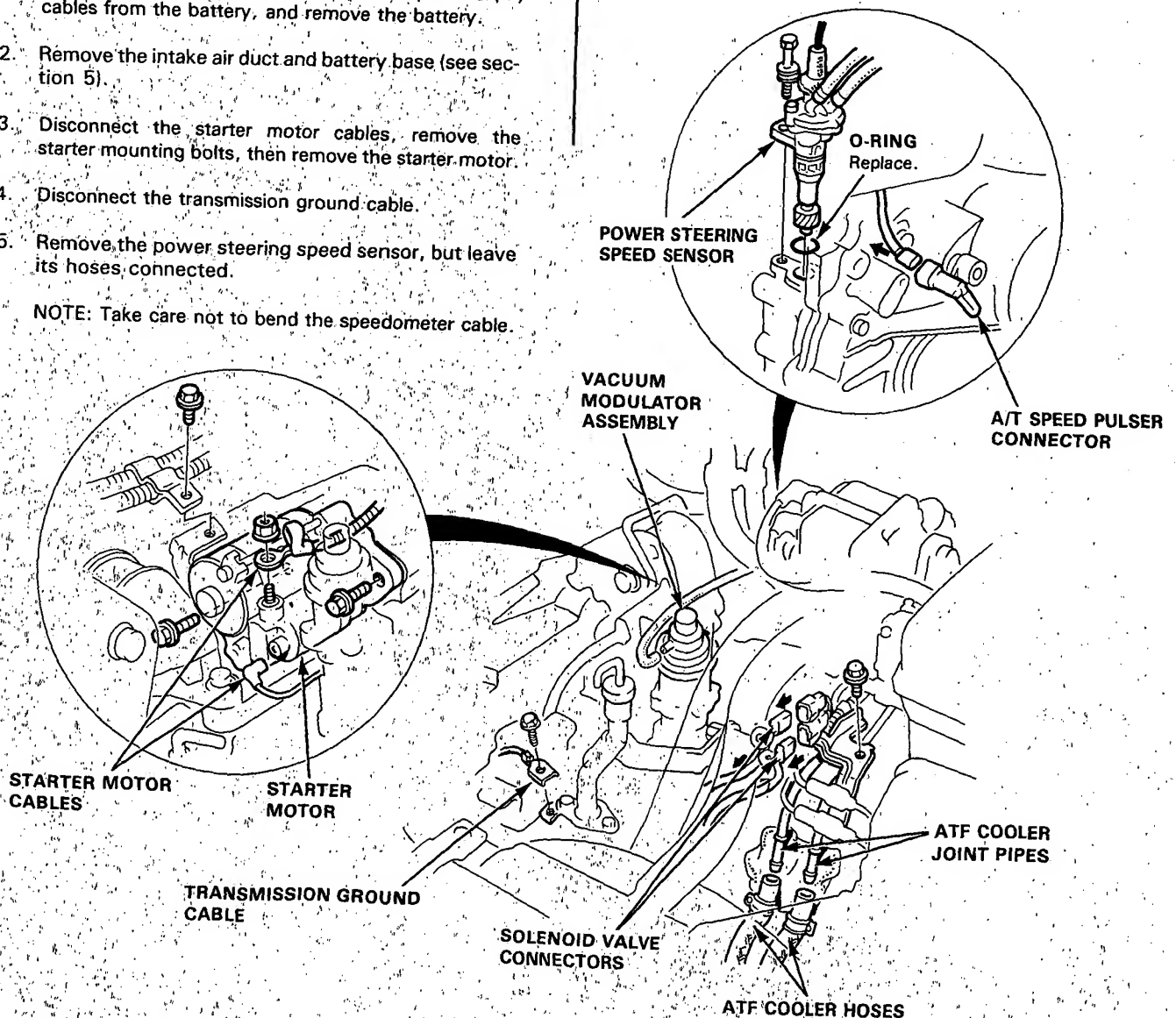
After reconnecting power and turning the radio ON, the word "CODE" will be displayed. Then enter the code.

1. Disconnect the battery negative (-) and positive (+) cables from the battery, and remove the battery.
2. Remove the intake air duct and battery base (see section 5).
3. Disconnect the starter motor cables, remove the starter mounting bolts, then remove the starter motor.
4. Disconnect the transmission ground cable.
5. Remove the power steering speed sensor, but leave its hoses connected.

**NOTE:** Take care not to bend the speedometer cable.

6. Disconnect the A/T speed pulser connector.
7. Disconnect the lock-up and shift control solenoid valve wire connectors.
8. Disconnect the vacuum hose from the vacuum modulator assembly.
9. Drain the transmission fluid. Use a socket to remove the drain plug. Remove the oil filler plug to speed draining. Reinstall the drain plug with a new washer.
10. Disconnect the ATF cooler hoses at the joint pipes.

**NOTE:** Check for any signs of leakage at the hose joints.

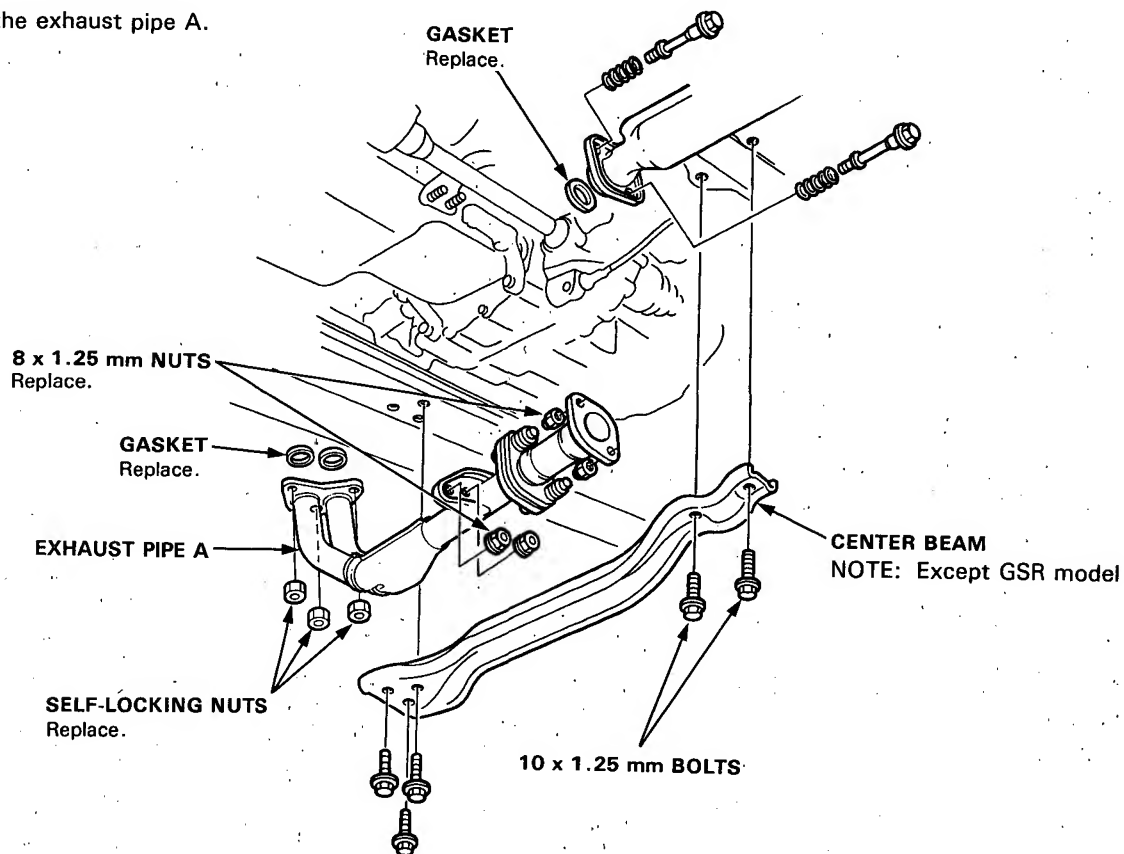




11. Remove the center beam.

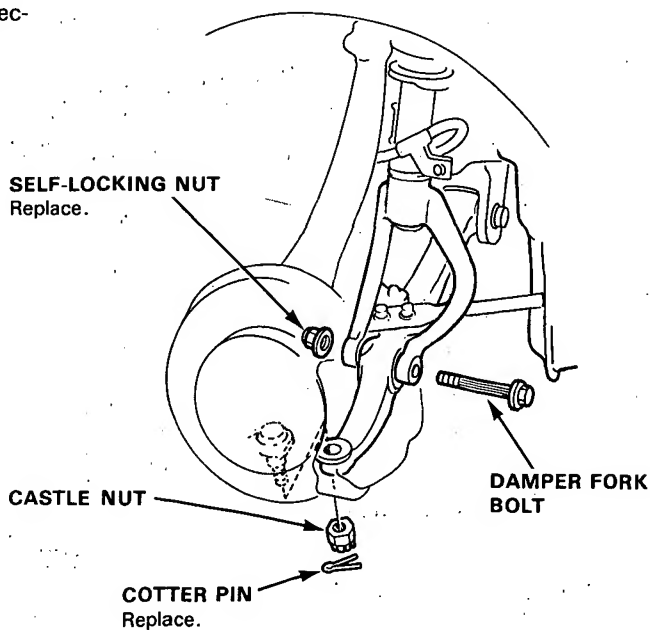
NOTE: Except GSR model

12. Remove the exhaust pipe A.



13. Remove the cotter pins and lower arm castle nuts, then separate the ball joints and lower arms (see section .18).

14. Remove the damper fork bolt.

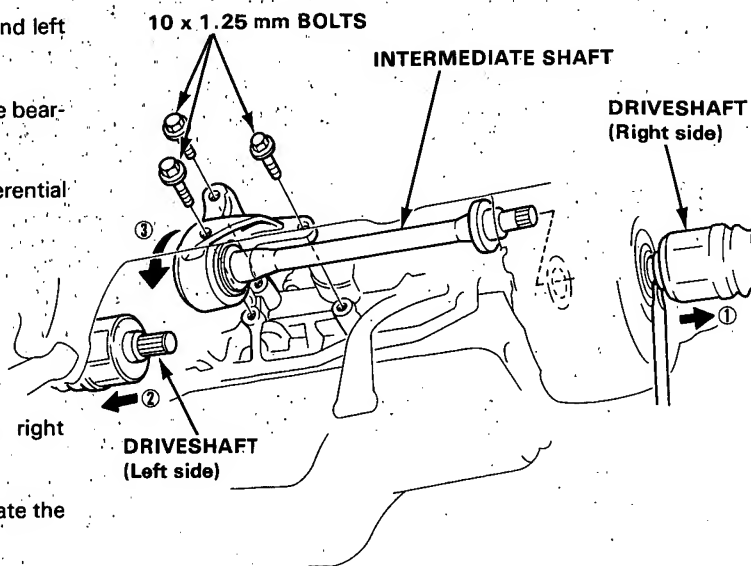


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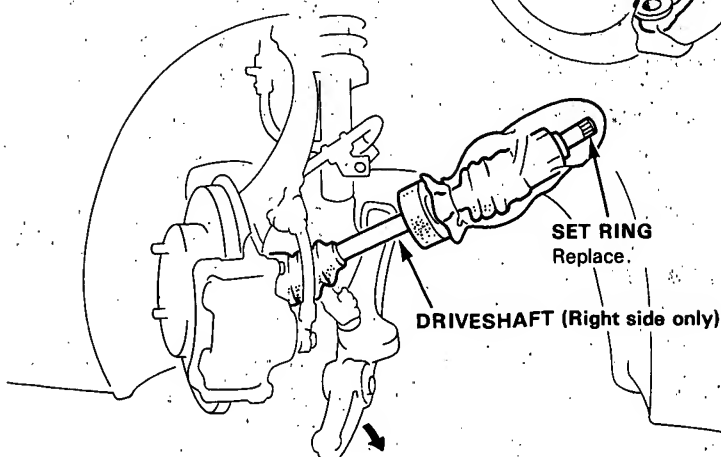
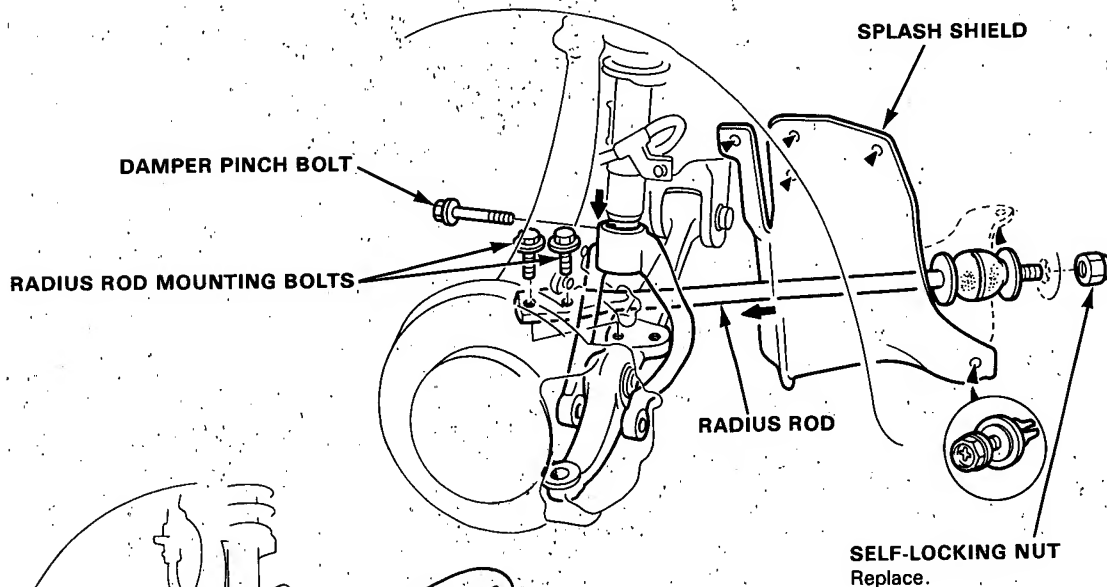
# Transmission

## Removal (cont'd)

15. Pry the right and left driveshafts out of the differential and the intermediate shaft.
16. Pull on the inboard joint and remove the right and left driveshafts (see section 16).
17. Remove the three mounting bolts and lower the bearing support.
18. Remove the intermediate shaft from the differential (see section 16).



19. Remove the engine splash shield and the right wheel well splash shield.
20. Remove the right damper pinch bolt, then separate the damper fork and damper.
21. Remove the bolts and nut, then remove the right radius rod.



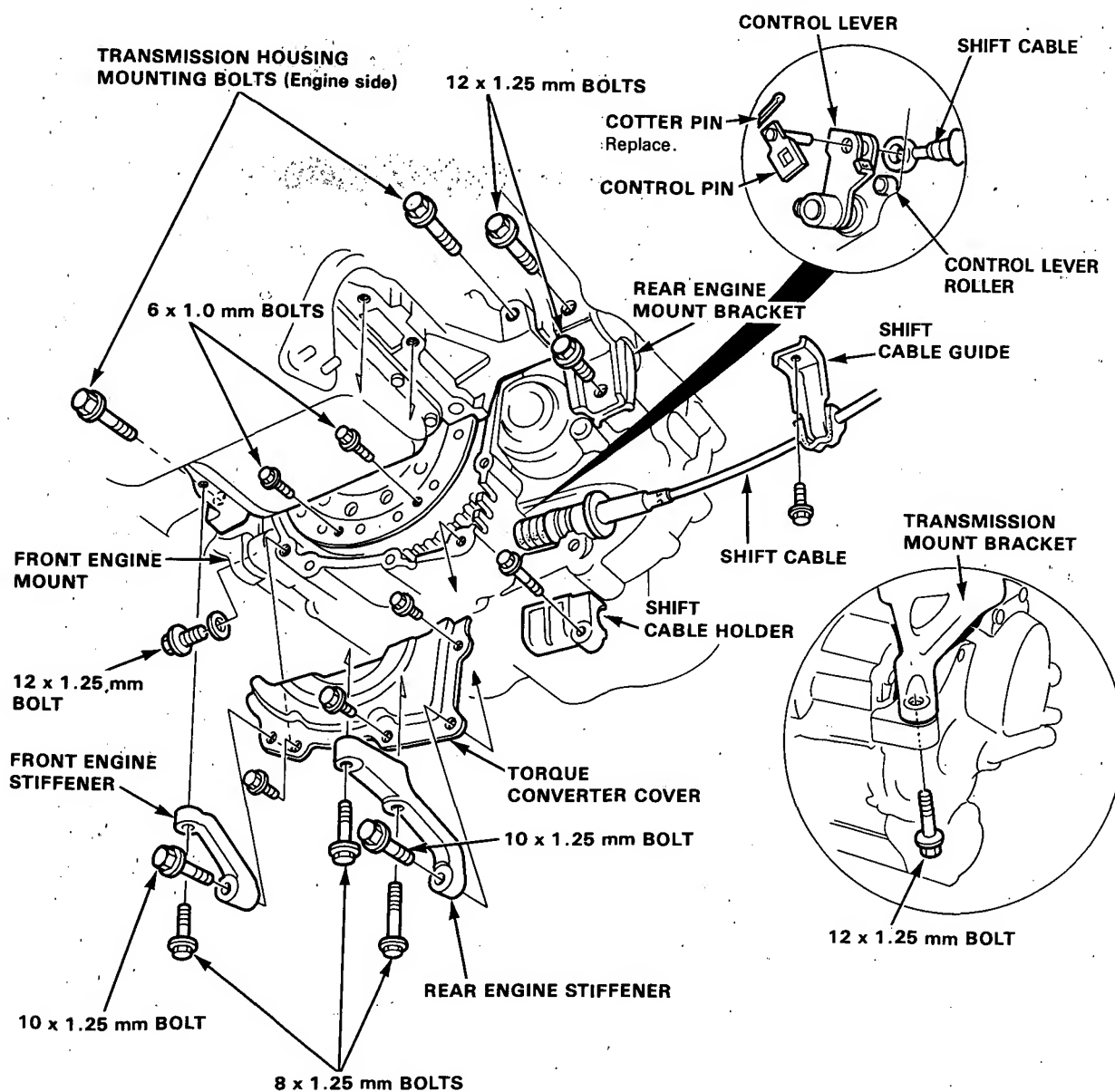
NOTE: Coat all precision finished surfaces with clean engine oil or grease.  
Tie plastic bags over the driveshaft ends.



22. Remove the front and rear engine stiffeners.
23. Remove the torque converter cover and shift cable holder.
24. Remove the shift cable by removing the cotter pin, control pin and control lever roller from the control lever.
25. Remove the shift cable guide.

NOTE: Take care not to bend the control cable.

26. Remove the plug, then remove the drive plate bolts one at a time while rotating the crankshaft pulley.
27. Remove the mounting bolt from the front engine mount.
28. Remove the two mounting bolts from the rear engine mount bracket.
29. Remove the front and rear transmission housing mounting bolts (Engine side).
30. Remove the mounting bolt from the transmission mount bracket.

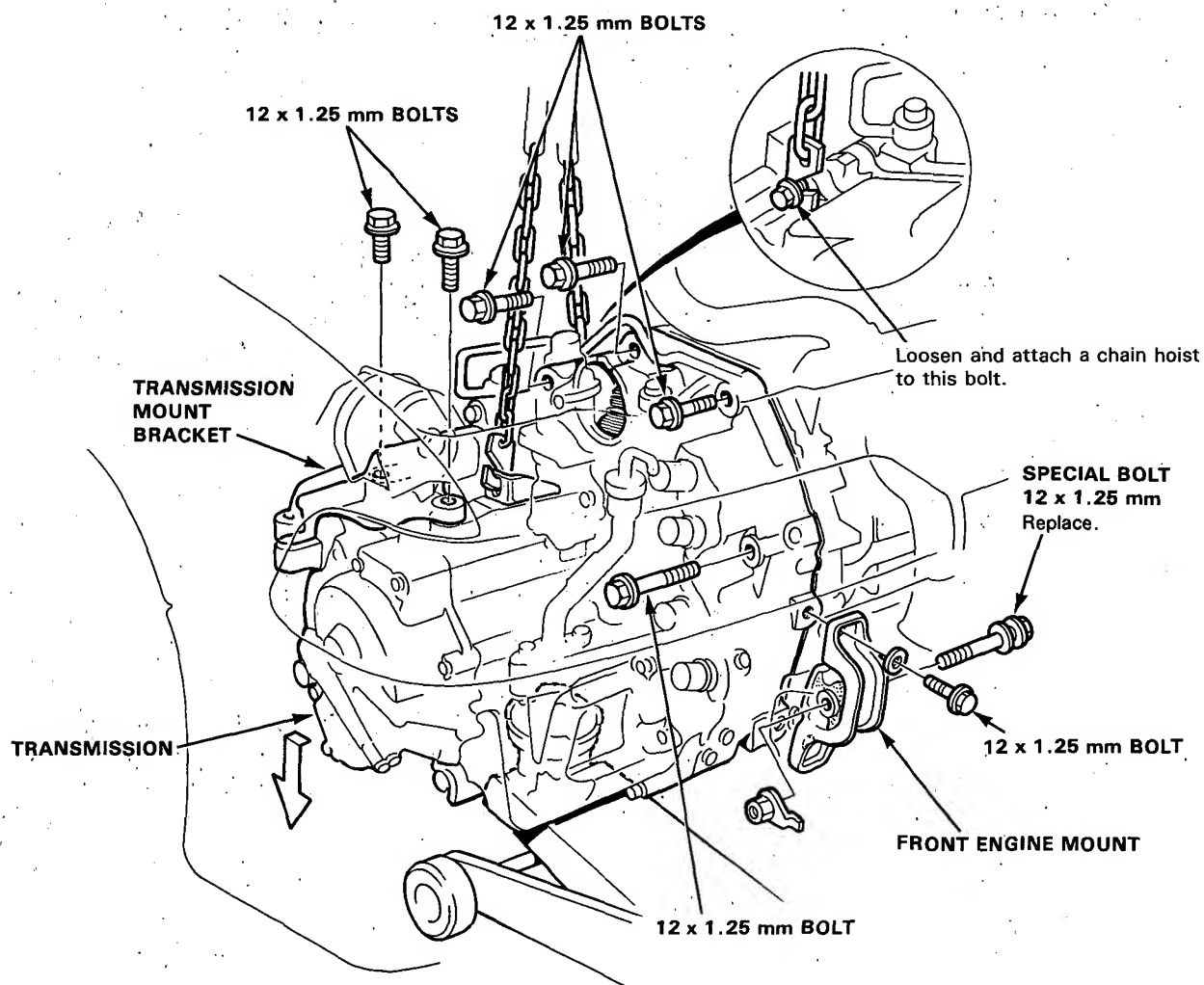


(cont'd)

# Transmission

## Removal (cont'd)

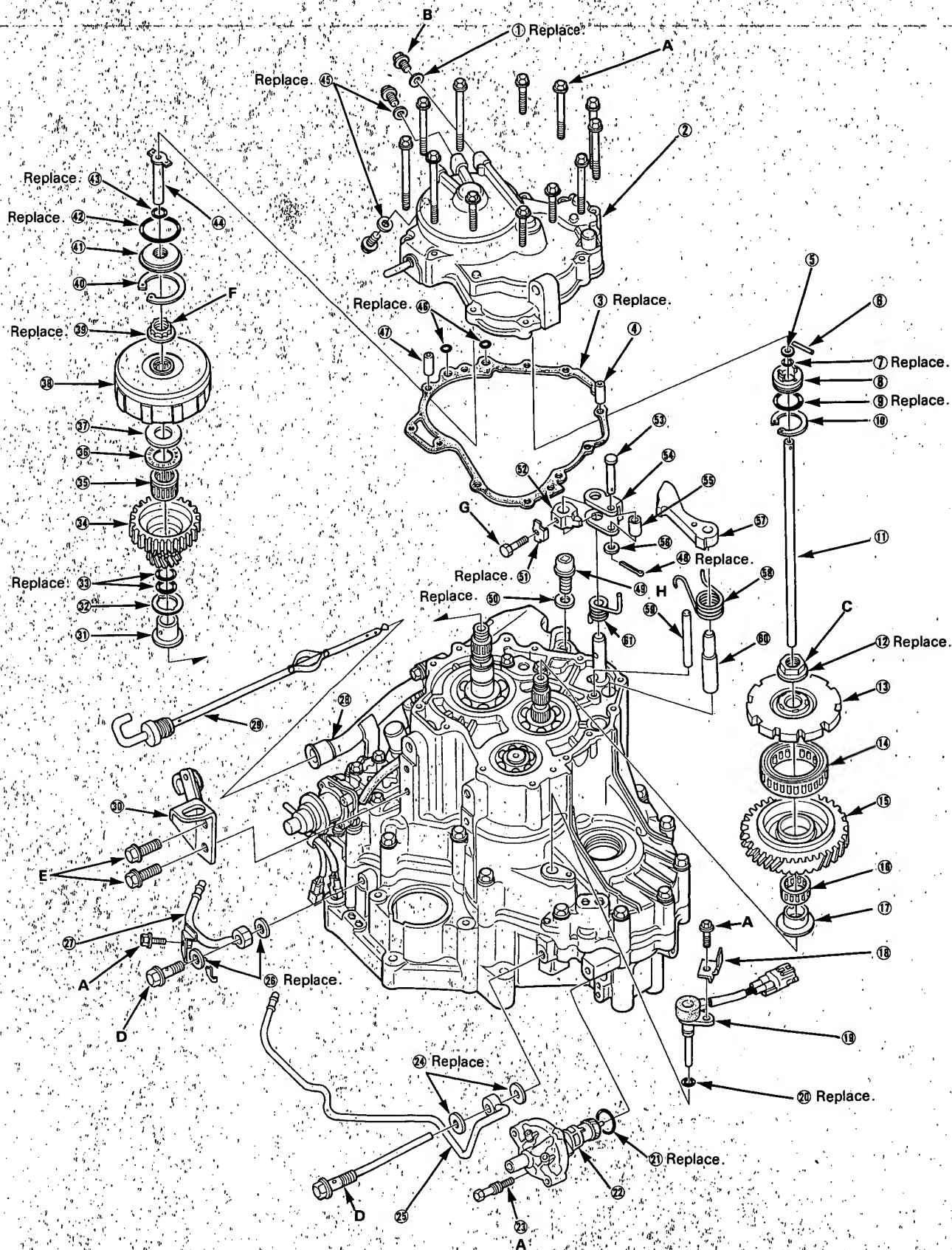
31. Loosen the transmission housing mounting bolt as shown.
32. Attach a chain hoist to the transmission hoist bracket and transmission housing mounting bolt; then lift the engine slightly to unload the mounts as shown.
33. Place a jack under the transmission and raise the transmission just enough to take weight off mounts.
34. Remove the front engine mount.
35. Remove the four transmission housing mounting bolts and two transmission mount bracket bolts.
36. Pull the transmission away from the engine until it clears the 14 mm dowel pins, then lower on the transmission jack.





# Illustrated Index

## Right Side Cover







	Torque Value	Bolt Size	Note
A	12 N·m (1.2 kg-m, 9 lb-ft)	6 x 1.0 mm	Left-hand threads.
B	18 N·m (1.8 kg-m, 13 lb-ft)	8 x 1.25 mm	
C	140→0→140 N·m (14.0→0→14.0 kg-m, 102→0→102 lb-ft)	23 x 1.25 mm	
D	29 N·m (2.9 kg-m, 21 lb-ft)	12 x 1.25 mm	
E	55 N·m (5.5 kg-m, 40 lb-ft)	10 x 1.25 mm	
F	95→0→95 N·m (9.5→0→9.5 kg-m, 70→0→70 lb-ft)	19 x 1.25 mm	
G	14 N·m (1.4 kg-m, 10 lb-ft)	6 x 1.0 mm	
H	40 N·m (4.0 kg-m, 29 lb-ft)	14 x 1.5 mm	
I	27 N·m (2.7 kg-m, 20 lb-ft)	8 x 1.25 mm	

①SEALING WASHER Replace.

②RIGHT SIDE COVER

③GASKET Replace.

④DOWEL PIN

⑤FEED PIPE WASHER

⑥PIN

⑦O-RING Replace.

⑧FEED PIPE FLANGE

⑨O-RING Replace.

⑩SNAP RING

⑪3RD CLUTCH FEED PIPE

⑫COUNTERSHAFT LOCKNUT Replace.

⑬PARKING GEAR

⑭ONE-WAY CLUTCH

⑮COUNTERSHAFT 1ST GEAR

⑯NEEDLE BEARING

⑰COLLAR

⑱BRACKET

⑲A/T SPEED PULSER

⑳O-RING Replace.

㉑O-RING Replace.

㉒POWER STEERING SPEED SENSOR

㉓SPECIAL BOLT

㉔SEALING WASHERS Replace.

㉕ATF COOLER PIPE (A)

㉖SEALING WASHERS Replace.

㉗ATF COOLER PIPE (B)

㉘ATF LEVEL GAUGE PIPE

㉙ATF LEVEL GAUGE

㉚TRANSMISSION HOIST BRACKET

㉛COLLAR

㉜THRUST WASHER

㉝O-RINGS Replace.

㉞MAINSHAFT 1ST GEAR

㉟NEEDLE BEARING

㊱THRUST NEEDLE BEARING

㊲THRUST WASHER

㊳1ST CLUTCH

㊴MAINSHAFT LOCKNUT Replace.

㊵SNAP RING

㊶FEED PIPE GUIDE

㊷O-RING Replace.

㊸O-RING Replace.

㊹1ST CLUTCH FEED PIPE

㊺SEALING WASHERS Replace.

㊻O-RINGS Replace.

㊼DOWEL PIN

㊽COTTER PIN Replace.

㊾DRAIN PLUG

㊿SEALING WASHER Replace.

①LOCK WASHER Replace.

②PARKING BRAKE STOPPER

③ROLLER PIN

④PARKING SHIFT ARM

⑤ROLLER

⑥WASHER

⑦PARKING PAWL

⑧PARKING BRAKE SPRING

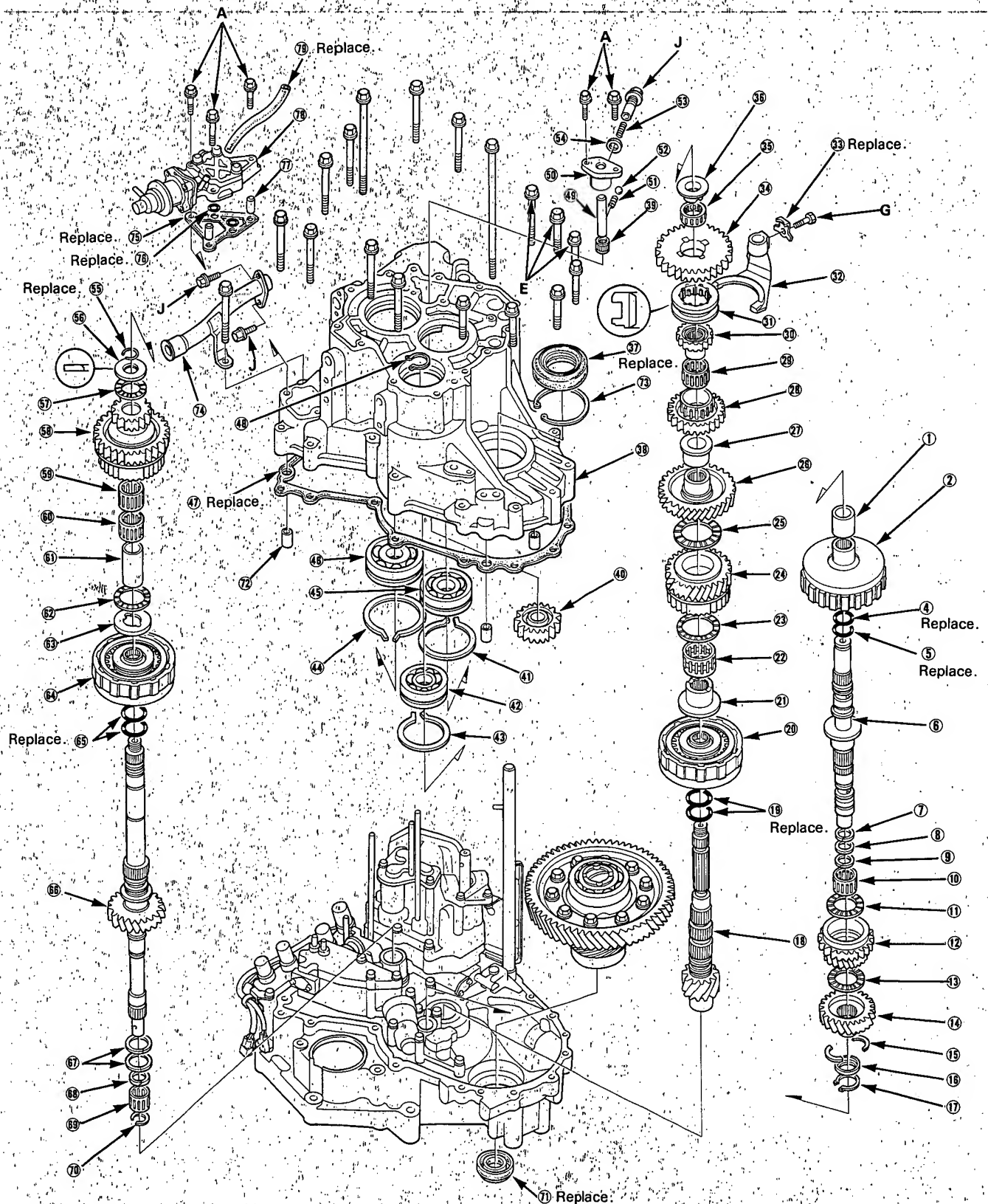
⑨STOPPER PIN

⑩PARKING PAWL SHAFT

⑪RETURN SPRING

# Illustrated Index

## Transmission Housing





	Torque Value	Bolt Size	Note
A	12 N·m (1.2 kg-m, 9 lb-ft)	6 x 1.0 mm	
G	14 N·m (1.4 kg-m, 10 lb-ft)	6 x 1.0 mm	
E	55 N·m (5.5 kg-m, 40 lb-ft)	10 x 1.25 mm	
J	27 N·m (2.7 kg-m, 20 lb-ft)	10 x 1.25 mm	

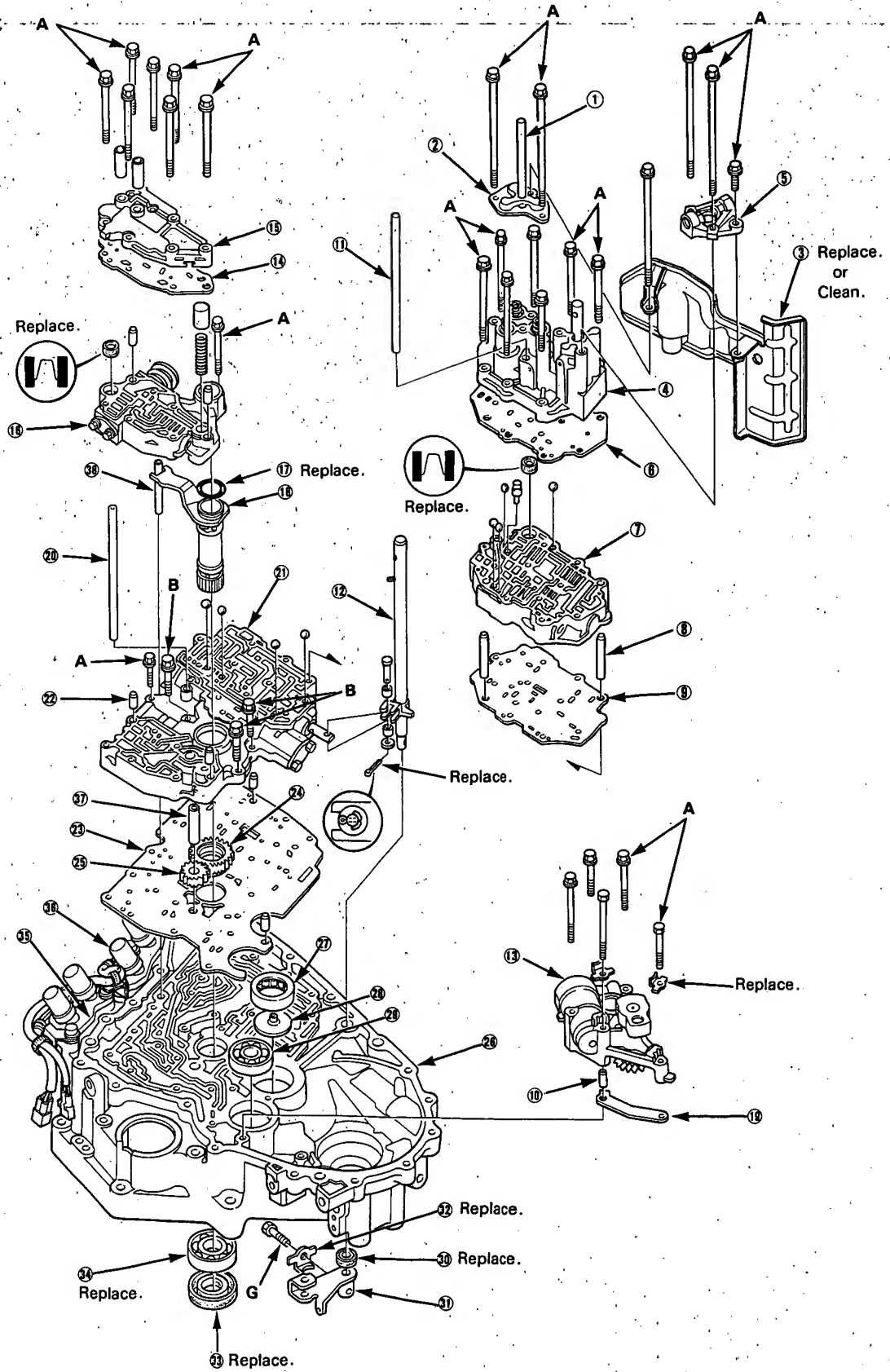
①DISTANCE COLLAR 25 mm  
 ②2ND CLUTCH  
 ④O-RING Replace.  
 ⑤O-RING Replace.  
 ⑥SECONDARY SHAFT  
 ⑦SEALING RING  
 ⑧SEALING RING  
 ⑨SEALING RING  
 ⑩NEEDLE BEARING  
 ⑪THRUST NEEDLE BEARING  
 ⑫2ND DRIVE GEAR  
 ⑬THRUST NEEDLE BEARING  
 ⑭SECONDARY 2ND GEAR  
 ⑮COTTERS 26 mm  
 ⑯COTTER RETAINER  
 ⑰CIRCLIP  
 ⑱COUNTERSHAFT  
 ⑲O-RINGS Replace.  
 ⑳3RD CLUTCH  
 ㉑3RD GEAR DISTANCE COLLAR  
 ㉒NEEDLE BEARING  
 ㉓THRUST NEEDLE BEARING  
 ㉔COUNTERSHAFT 3RD GEAR  
 ㉕THRUST NEEDLE BEARING  
 ㉖COUNTERSHAFT 2ND GEAR

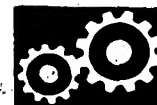
㉗DISTANCE COLLAR 29 mm  
 ㉘COUNTERSHAFT 4TH GEAR  
 ㉙NEEDLE BEARING  
 ㉚SELECTOR HUB  
 ㉛REVERSE SELECTOR  
 ㉜REVERSE SHIFT FORK  
 ㉝LOCK WASHER Replace.  
 ㉞COUNTERSHAFT REVERSE GEAR  
 ㉟NEEDLE BEARING  
 ㊱REVERSE GEAR COLLAR  
 ㊲OIL SEAL 40 x 76 x 9 mm Replace.  
 ㊳TRANSMISSION HOUSING  
 ㊴NEEDLE BEARING  
 ㊵REVERSE IDLER GEAR  
 ㊶SNAP RING 68 mm  
 ㊷BALL BEARING 6305  
 ㊸SNAP RING  
 ㊹SNAP RING 75 mm  
 ㊺BALL BEARING  
 ㊻BALL BEARING  
 ㊼GASKET Replace.  
 ㊽SET RING 25 mm  
 ㊾REVERSE IDLER GEAR SHAFT  
 ㊿REVERSE IDLER GEAR SHAFT  
 ①HOLDER  
 ②SPRING  
 ③STEEL BALL

④SPRING  
 ⑤WASHER  
 ⑥SNAP RING 26 mm Replace.  
 ⑦WASHER  
 ⑧THRUST NEEDLE BEARING  
 ⑨MAINSHAFT 4TH GEAR  
 ⑩NEEDLE BEARING  
 ⑪NEEDLE BEARING  
 ⑫MAINSHAFT 4TH GEAR COLLAR  
 ⑬THRUST NEEDLE BEARING  
 ⑭THRUST WASHER  
 ⑮4TH CLUTCH  
 ⑯O-RINGS Replace.  
 ⑰MAINSHAFT  
 (MAINSHAFT 3RD GEAR)  
 ⑱SEALING RINGS 35 mm  
 ⑲SEALING RING 29 mm  
 ㉑NEEDLE BEARING  
 ㉒SET RING 23 mm  
 ㉓OIL SEAL Replace.  
 ㉔DOWEL PIN  
 ㉕SNAP RING  
 ㉖ATF LEVEL GAUGE PIPE  
 ㉗GASKET Replace.  
 ㉘O-RING Replace.  
 ㉙DOWEL PIN  
 ㉚VACUUM MODULATOR ASSEMBLY  
 ㉛TUBE Replace.

# Illustrated Index

## Torque Converter Housing





	Torque Value	Bolt Size	Note
A	12 N•m (1.2 kg-m, 9 lb-ft)	6 x 1.0 mm	
B	18 N•m (1.8 kg-m, 13 lb-ft)	8 x 1.25 mm	
G	14 N•m (1.4 kg-m, 10 lb-ft)	6 x 1.0 mm	

①CLUTCH FEED PIPE  
②ACCUMULATOR COVER  
③ATF STRAINER  
④SERVO VALVE BODY  
⑤SERVO DETENT BASE  
⑥SERVO SEPARATOR PLATE  
⑦SECONDARY VALVE BODY  
⑧DOWEL PIN  
⑨SECONDARY SEPARATOR PLATE  
⑩DOWEL PIN  
⑪CLUTCH FEED PIPE  
⑫CONTROL SHAFT  
⑬2ND ACCUMULATOR BODY  
⑭LOCK-UP SEPARATOR PLATE  
⑮LOCK-UP COVER  
⑯REGULATOR VALVE BODY  
⑰O-RING Replace.  
⑱STATOR SHAFT ASSEMBLY  
⑲2ND ACCUMULATOR BODY PLATE

⑳CLUTCH FEED PIPE  
㉑MAIN VALVE BODY  
㉒DOWEL PIN  
㉓MAIN SEPARATOR PLATE  
㉔PUMP DRIVE GEAR  
㉕PUMP DRIVEN GEAR  
㉖TORQUE CONVERTER HOUSING  
㉗NEEDLE BEARING 36 x 62 x 18 mm  
㉘OIL GUIDE PLATE  
㉙BALL BEARING  
㉚OIL SEAL Replace.  
㉛CONTROL LEVER  
㉜LOCK WASHER Replace.  
㉝OIL SEAL 44 x 68 x 8 mm Replace.  
㉞BALL BEARING 16008 Replace.  
㉟LOCK-UP CONTROL SOLENOID VALVE ASSEMBLY  
㊱SHIFT CONTROL SOLENOID VALVE ASSEMBLY  
㊲PUMP DRIVEN GEAR SHAFT  
㊳STOPPER SHAFT

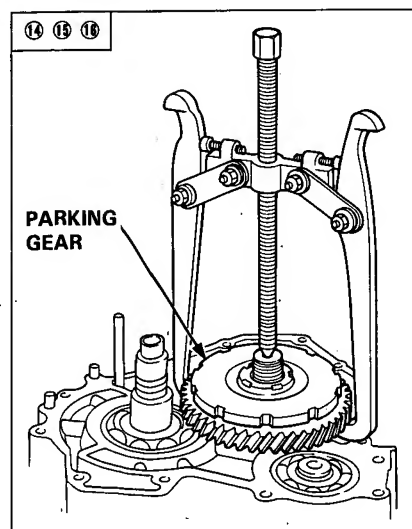
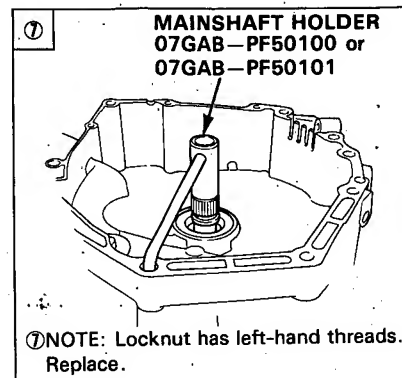
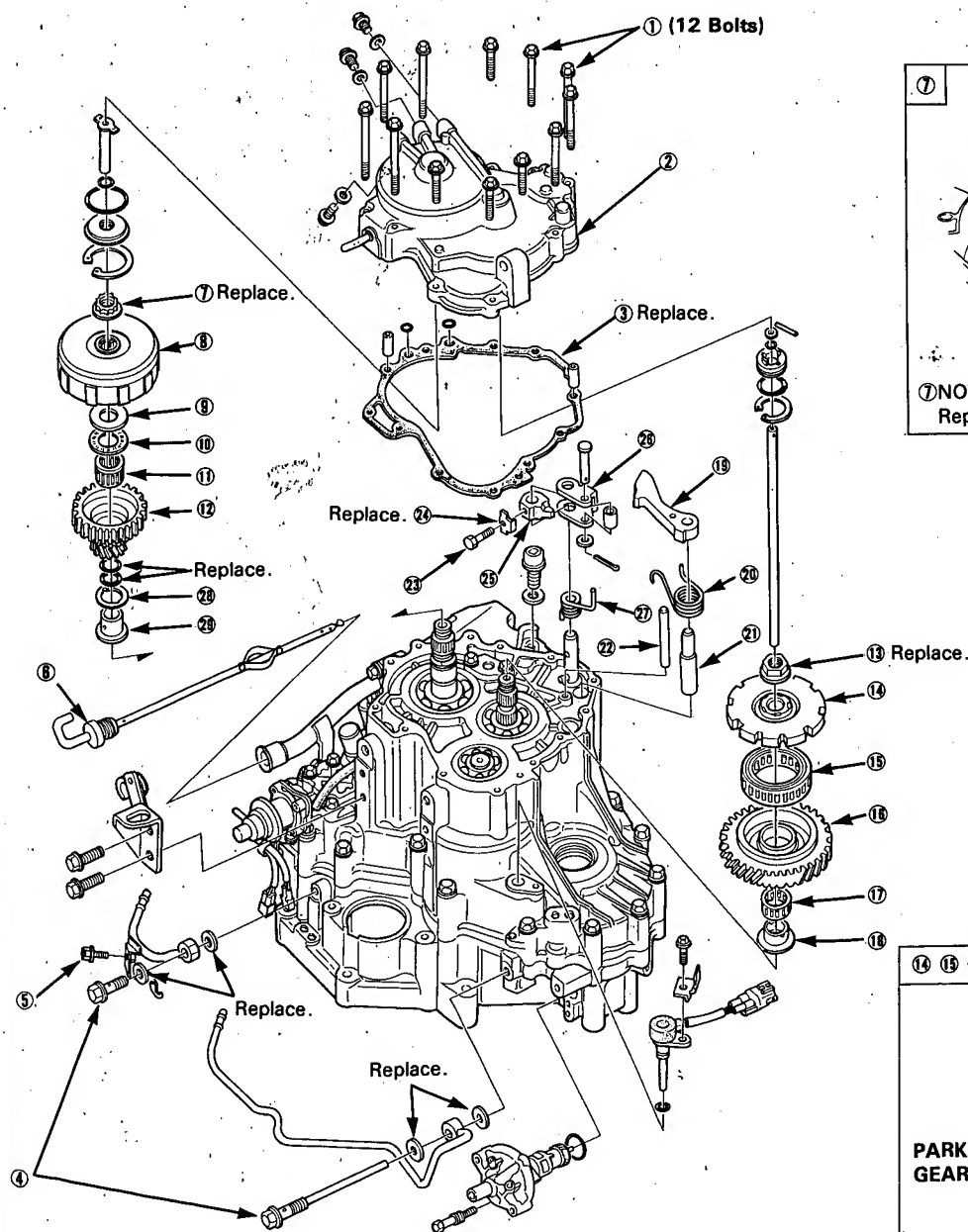
# Right Side Cover

## Removal

### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner and dry with compressed air. Blow out all passages.
- Coat all parts with ATF before reassembly.

1. Remove the right side cover and the transmission housing in the following numbered sequence.

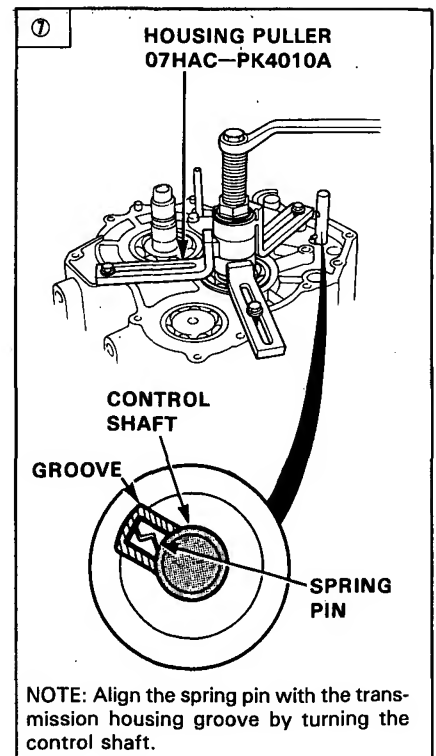
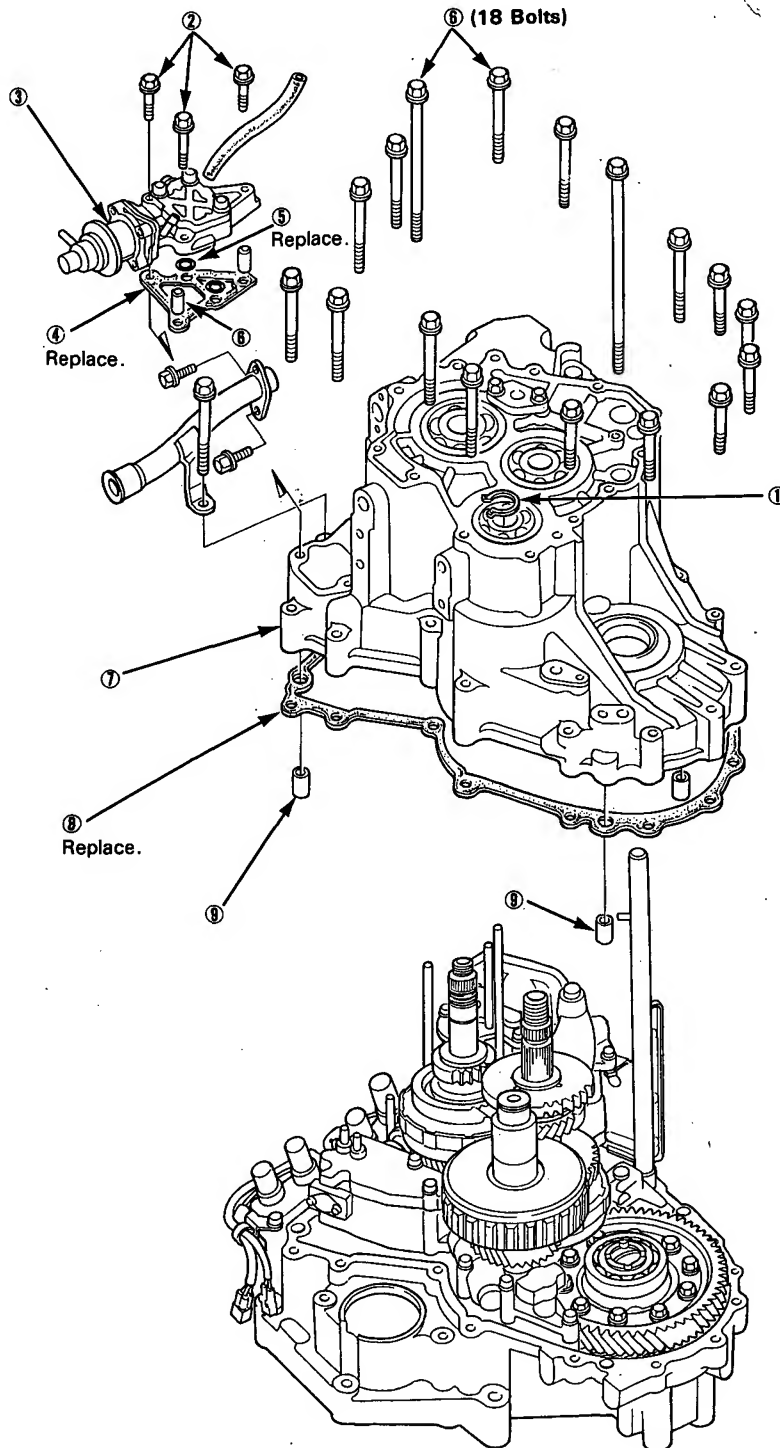


# Transmission Housing



## Removal

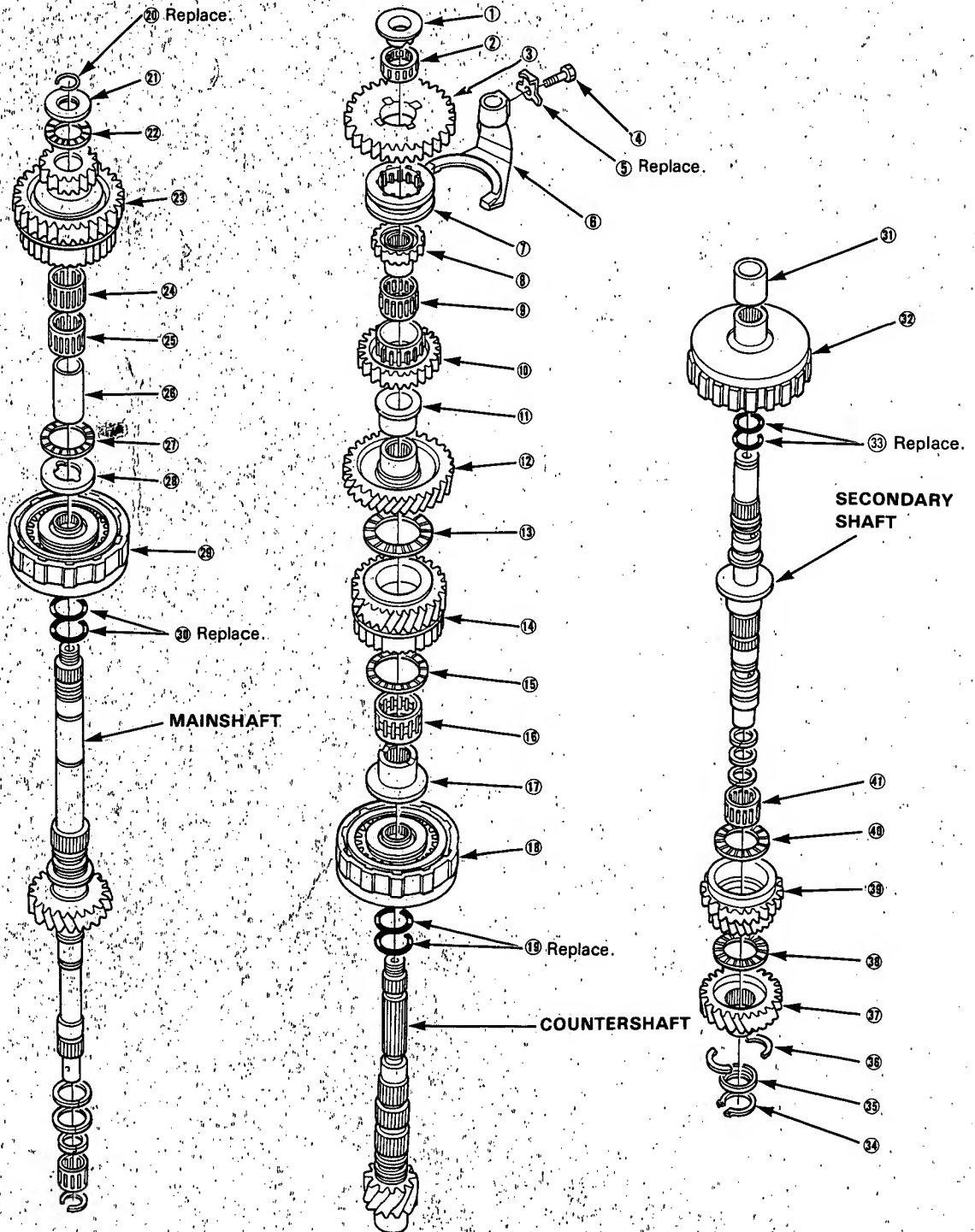
1. Remove the transmission housing in the following numbered sequence.



# Mainshaft/Countershaft/Secondary Shaft

## Removal

1. Remove parts number ① through ⑪ with the mainshaft, countershaft and secondary shaft installed in the torque converter housing.
2. Remove the mainshaft and countershaft together.
3. Remove parts number ⑫ through ⑲ from the countershaft.
4. Remove parts number ⑳ through ㉓ from the mainshaft.
5. Remove parts number ㉔ through ㉗ from the secondary shaft.





# Valve Body



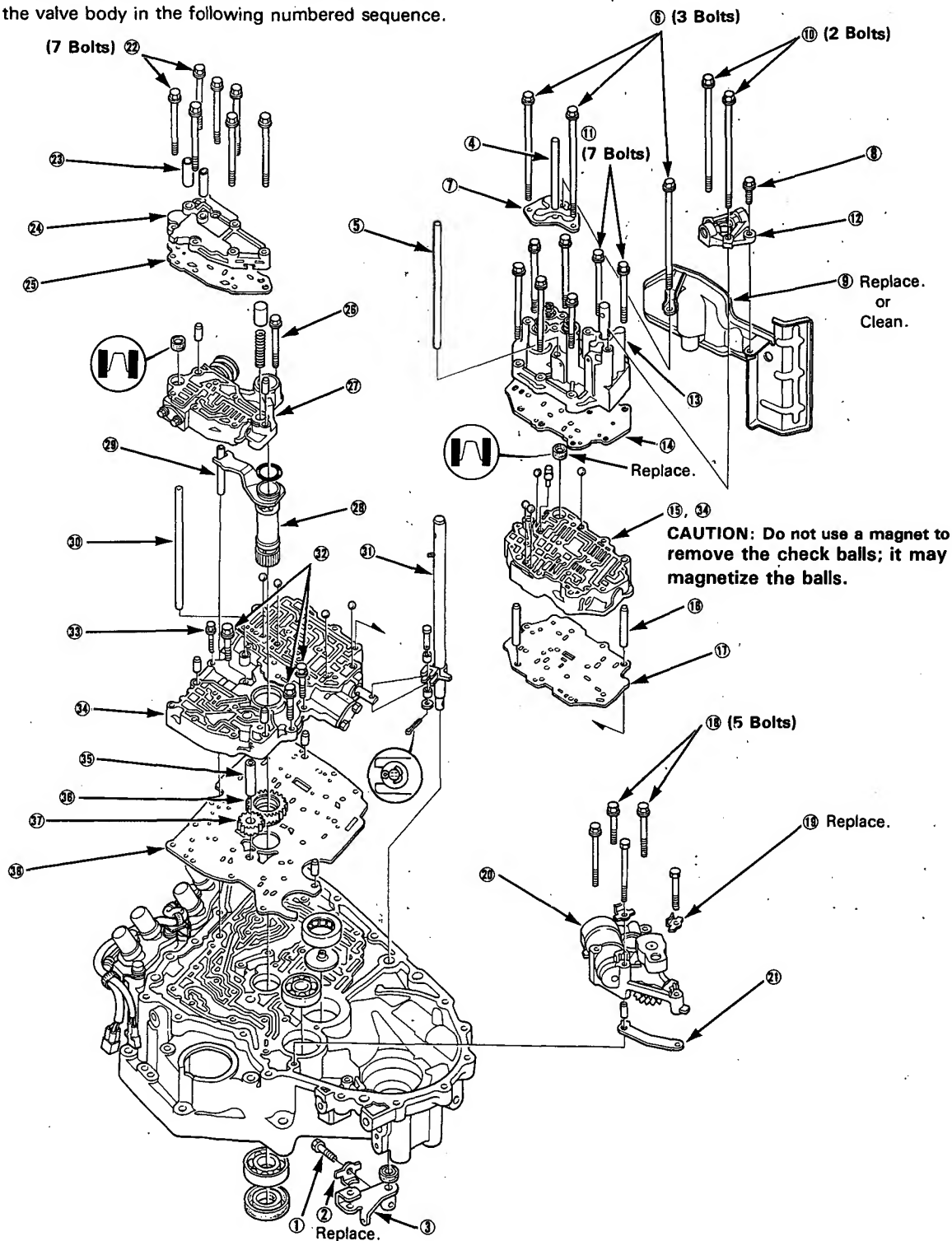
## Removal

### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner and dry with compressed air.
- Blow out all passages.
- Accumulator covers are spring loaded; to prevent stripping the threads in the torque converter housing, press down on the accumulator covers while unscrewing the bolts in a crisscross pattern.

**CAUTION:** Do not use a magnet to remove the check balls; it may magnetize the balls.

1. Remove the valve body in the following numbered sequence.



# Valve Body

## Repair

**NOTE:** This repair is only necessary if one or more of the valves in a valve body do not slide smoothly in their bores. You may use this procedure to free the valves in the main valve body, secondary valve body, regulator valve body, and servo valve body.

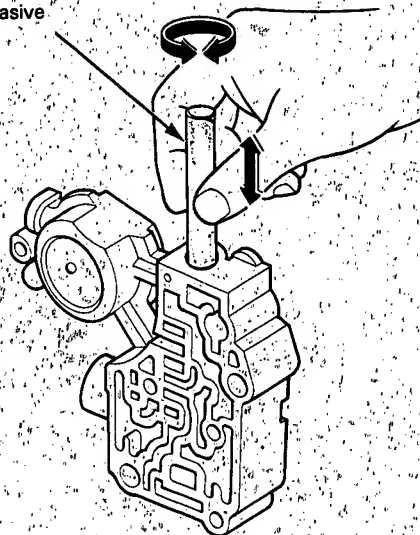
1. Soak a sheet of #600 abrasive paper in ATF for about 30 minutes.
2. Carefully tap the valve body so the sticking valve drops out of its bore.

**CAUTION:** It may be necessary to use a small screwdriver to pry the valve free. Be careful not to scratch the bore with the screwdriver.

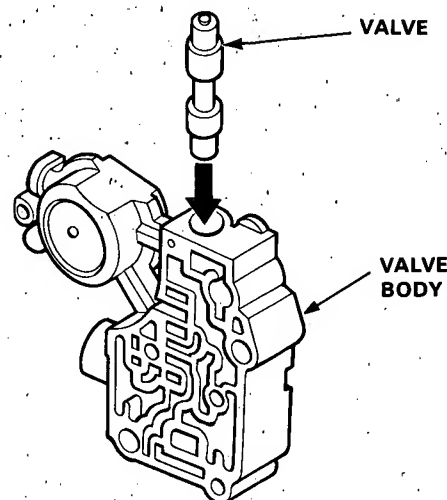
3. Inspect the valve for any scuff marks. Use the ATF-soaked #600 paper to polish off any burrs that are on the valve, then wash the valve in solvent and dry it with compressed air.
4. Roll up half a sheet of ATF-soaked paper and insert it in the valve bore of the sticking valve. Twist the paper slightly, so that it unrolls and fits the bore tightly, then polish the bore by twisting the paper as you push it in and out.

**CAUTION:** The valve body is aluminum and doesn't require much polishing to remove any burrs.

ATF-soaked  
#600 abrasive  
paper



5. Remove the #600 paper and thoroughly wash the entire valve body in solvent, then dry with compressed air.
6. Coat the valve with ATF then drop it into its bore. It should drop to the bottom of the bore under its own weight. If not, repeat step 4, then retest.



7. Remove the valve and thoroughly clean it and the valve body with solvent. Dry all parts with compressed air, then reassemble using ATF as a lubricant.

# Valve Caps



## Description

- Caps with one projected tip and one flat end are installed with the flat end toward the spring.
- Caps with a projected tip on each end are installed with the smaller tip toward the spring. The small tip is a spring guide.

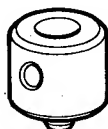
Toward outside of valve body.



Toward spring.

- Caps with one projected tip and hollow end are installed with the tip toward the spring. The tip is a spring guide.

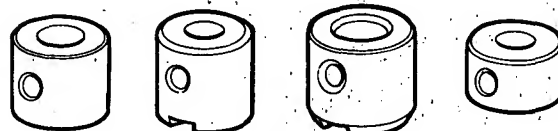
Toward outside of valve body.



Toward spring.

- Caps with hollow ends are installed with the hollow end away from the spring.
- Caps with notched ends are installed with the notch toward the spring.
- Caps with flat ends and a hole through the center are installed with the smaller hole toward the spring.

Toward outside of valve body.

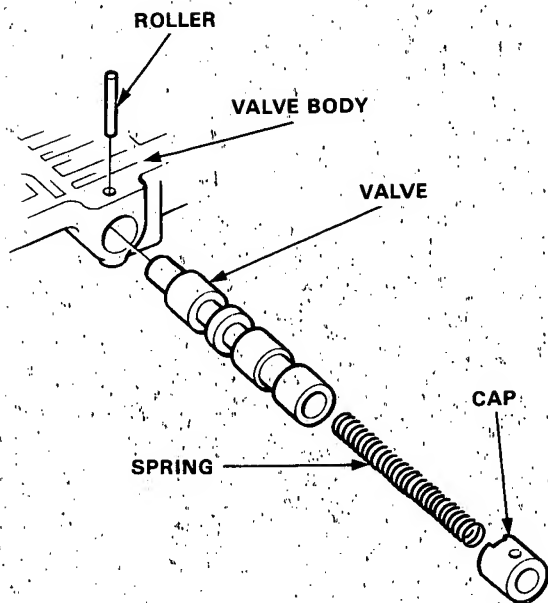
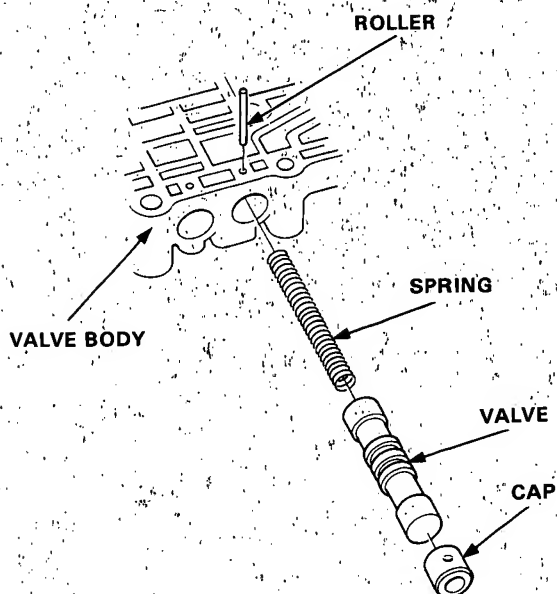


Toward spring.

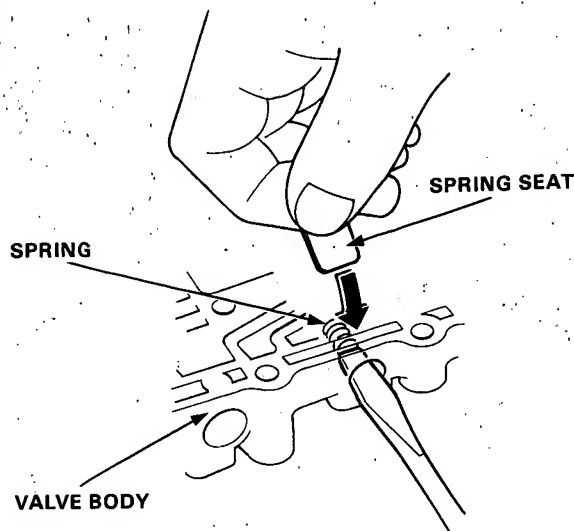
# Valve Assembly

NOTE: Coat all parts with ATF before assembly.

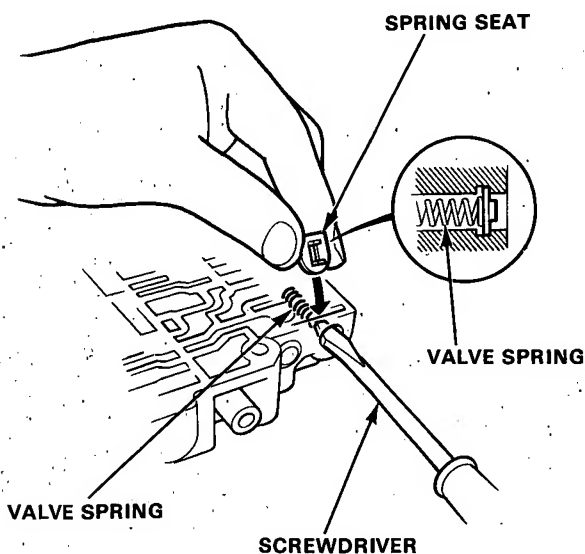
- Install the valve, valve spring and cap in the valve body and secure with the roller.

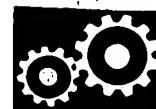


- Set the spring in the valve and install it in the valve body. Push the spring in with a screwdriver then install the spring seat.

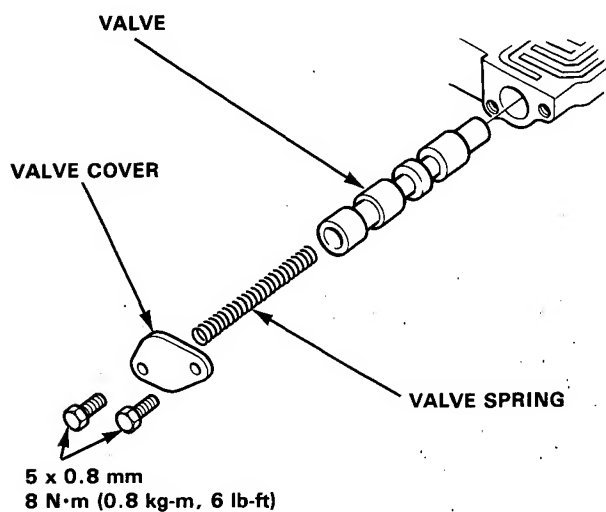


- Set the valve spring in the valve and install it in the valve body.
- Push the spring in with a screwdriver, then install the spring seat.

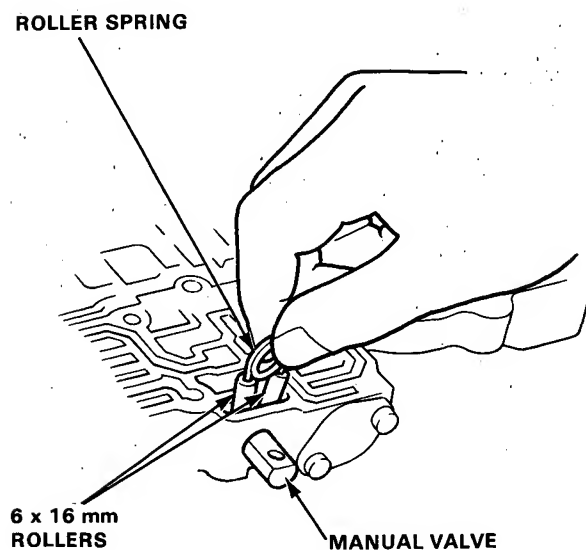




- Place the valve spring in the valve, then slip it into the valve body. Install the valve cover and the tighten the bolts.



- Install the manual valve, 6 x 16 mm rollers and roller spring.



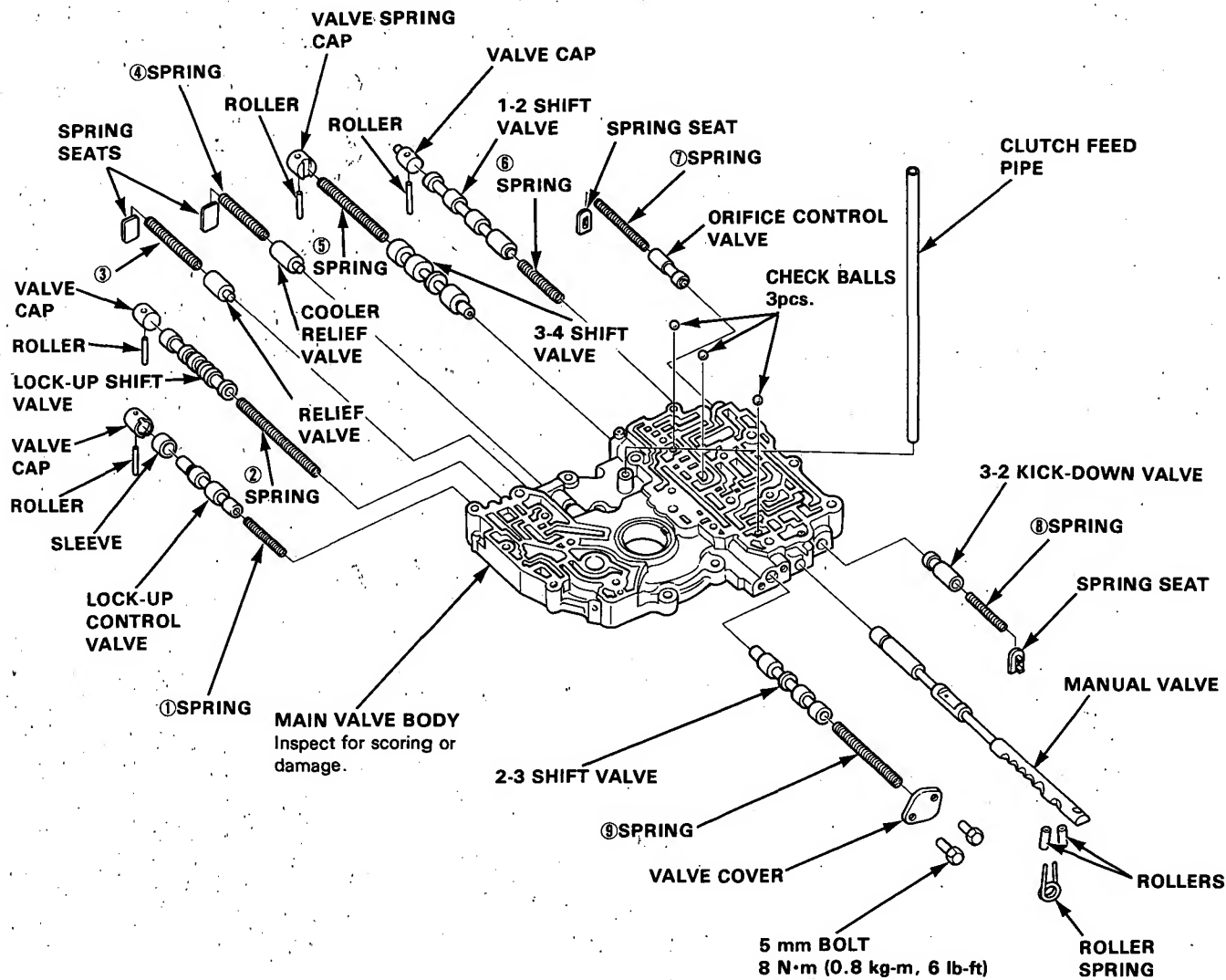
# Main Valve Body

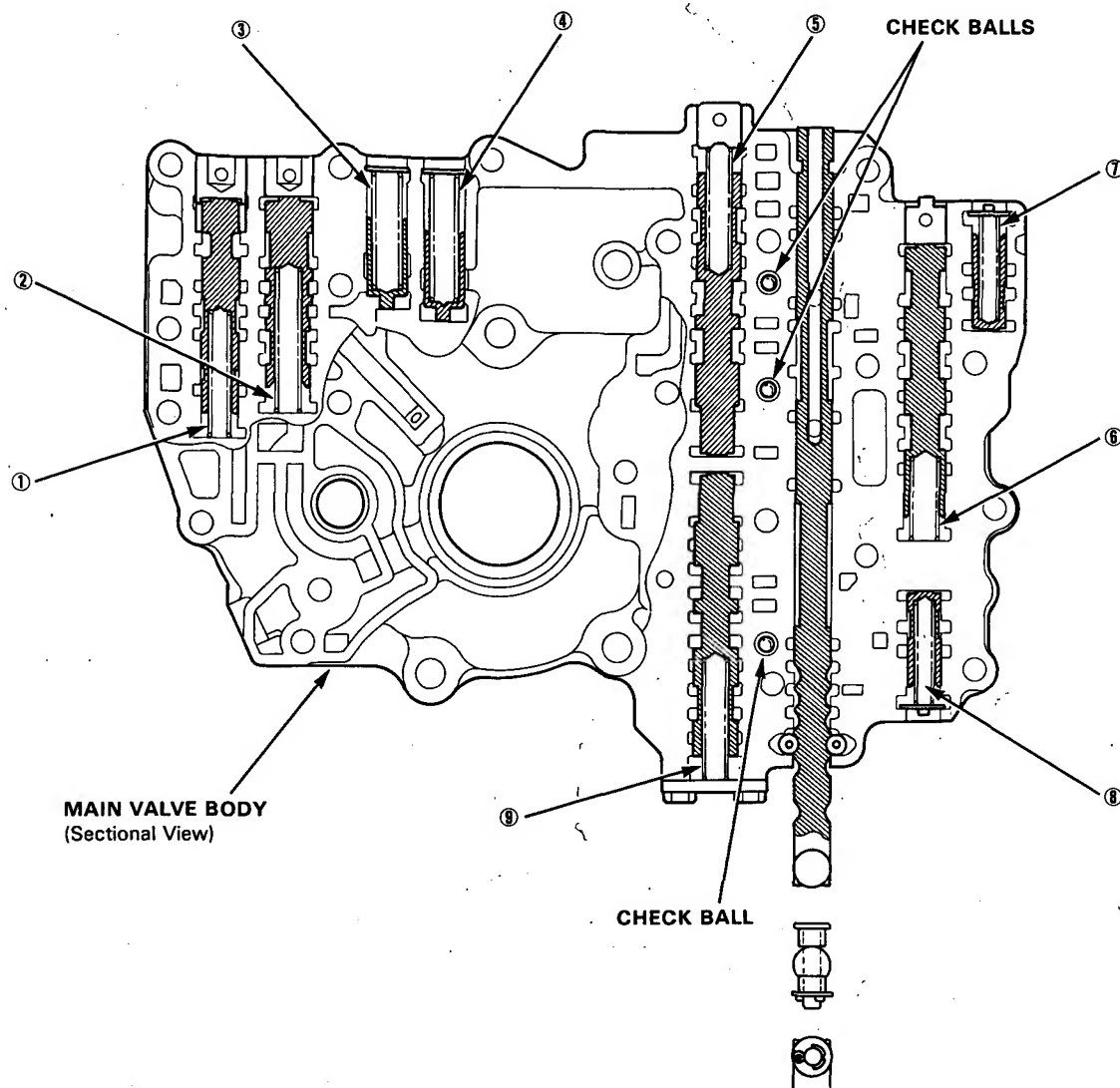
## Disassembly/Inspection/Reassembly

### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Replace valve body as an assembly if any parts are worn or damaged.
- Check all valves for free movement. If any fail to slide freely, see Valve Body Repair on page 14-90.
- Coat all parts with ATF before reassembly.

**CAUTION:** Do not use a magnet to remove the check balls; it may magnetize the balls.





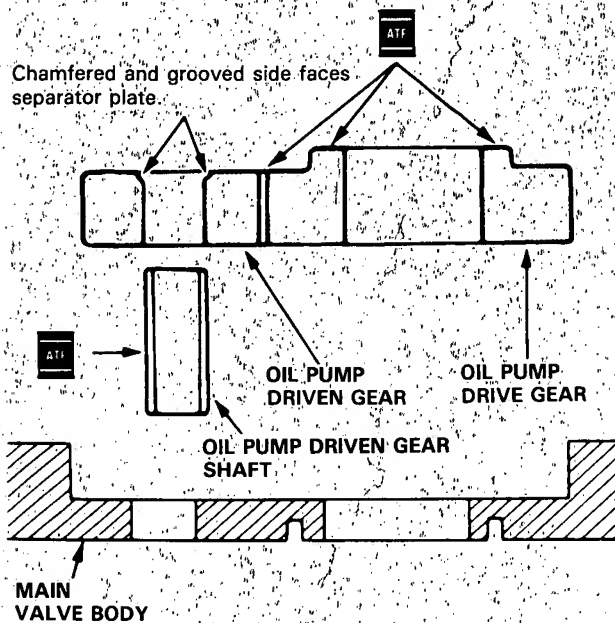
# Spring Specifications

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Lock-up control valve spring	0.7 (0.028)	6.6 (0.260)	38.0 (1.496)	14.1
②	Lock-up shift valve spring	0.9 (0.035)	7.6 (0.299)	73.7 (2.902)	32.0
③	Relief valve spring	1.0 (0.039)	8.4 (0.331)	52.0 (2.047)	23.0
④	Cooler relief valve spring	1.1 (0.043)	8.4 (0.331)	46.8 (1.843)	17.0
⑤	3-4 shift valve spring	0.8 (0.031)	7.6 (0.299)	50.8 (2.000)	16.0
⑥	1-2 shift valve spring	0.9 (0.035)	8.6 (0.339)	40.4 (1.591)	14.5
⑦	Orifice control valve spring	0.8 (0.031)	6.1 (0.240)	41.8 (1.646)	22.4
⑧	2nd kick-down valve spring	1.2 (0.047)	6.1 (0.240)	31.1 (1.224)	15.7
⑨	2-3 shift valve spring	0.8 (0.031)	7.6 (0.299)	50.8 (2.000)	16.0

# Oil Pump Inspection

1. Install the oil pump gears and oil pump driven gear shaft in the main valve body.



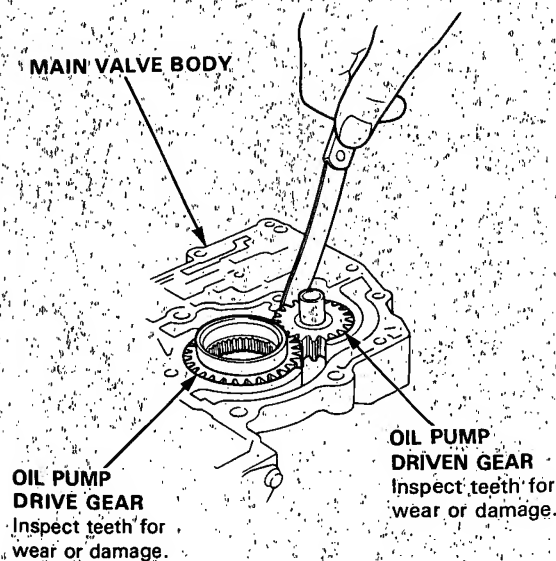
2. Measure the side clearance of the oil pump drive and driven gears.

## Oil Pump Gears Side (Radial) Clearance:

### Standard (New):

Oil Pump Drive gear 0.210–0.265 mm  
(0.0083–0.0104 in.)

Oil Pump Driven gear 0.035–0.063 mm  
(0.0014–0.0025 in.)



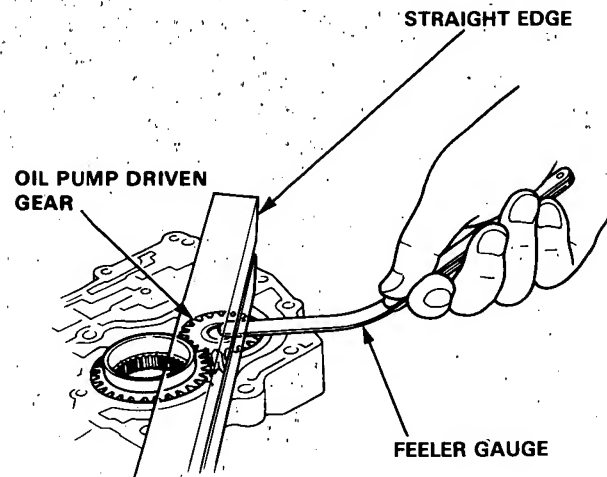
3. Remove the oil pump driven gear shaft and measure the thrust clearance of the oil pump driven gear-to-valve body.

## Oil Pump Drive/Driven Gear Thrust (Axial) Clearance:

Standard (New): 0.03–0.05 mm

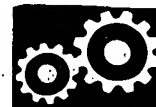
(0.001–0.002 in.)

Service Limit: 0.07 mm (0.0028 in.)





# Regulator Valve Body



## Disassembly/Inspection/Reassembly

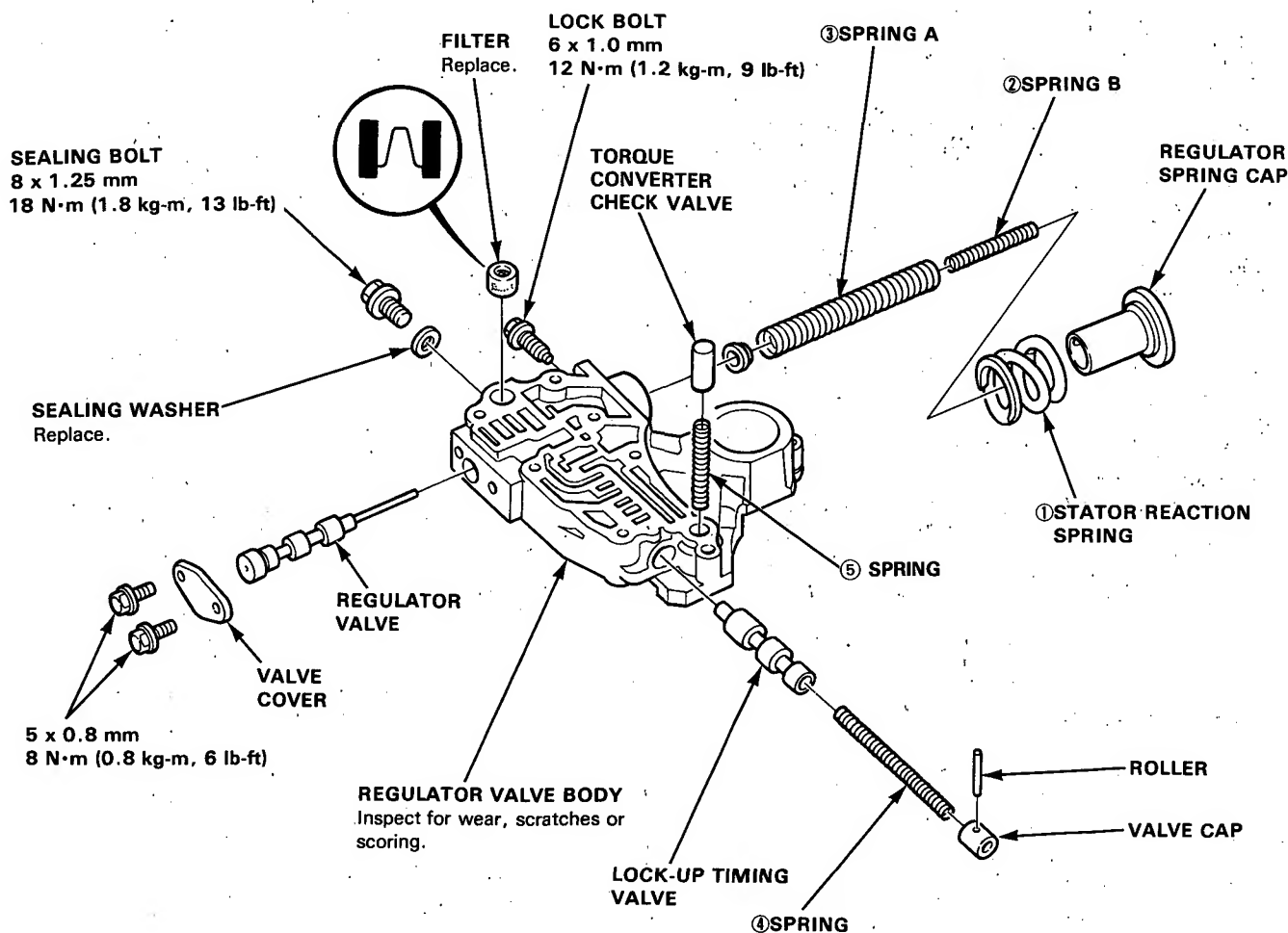
### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
- Blow out all passages.
- Replace valve body as an assembly if any parts are worn or damaged.
- Check all valves for free movement. If any fail to slide freely, see Valve Body Repair on page 14-90.

1. Hold the regulator spring cap in place while removing the lock bolt. Once the bolt is removed, release the spring cap slowly.  
**CAUTION: The regulator spring cap can pop out when the lock bolt is removed.**
2. Reassembly is in the reverse order of disassembly.

### NOTE:

- Coat all parts with ATF before reassembly.
- Align the hole in the regulator spring cap with the hole in the valve body, press the spring cap into the body and tighten the lock bolt.



### Spring Specifications

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Stator reaction spring	6.0 (0.236)	26.4 (1.039) *	30.3 (1.193)	2.0
②	Regulator valve spring B	1.8 (0.071)	6.0 (0.236) *	44.0 (1.732)	11.0
③	Regulator valve spring A	1.8 (0.071)	14.7 (0.579)	80.2 (3.157)	16.5
④	Lock-up timing valve spring	0.9 (0.035)	6.6 (0.260)	66.7 (2.626)	34.0
⑤	Torque converter check valve spring	1.1 (0.043)	8.4 (0.331)	36.4 (1.433)	12.0

\*Inside Diameter

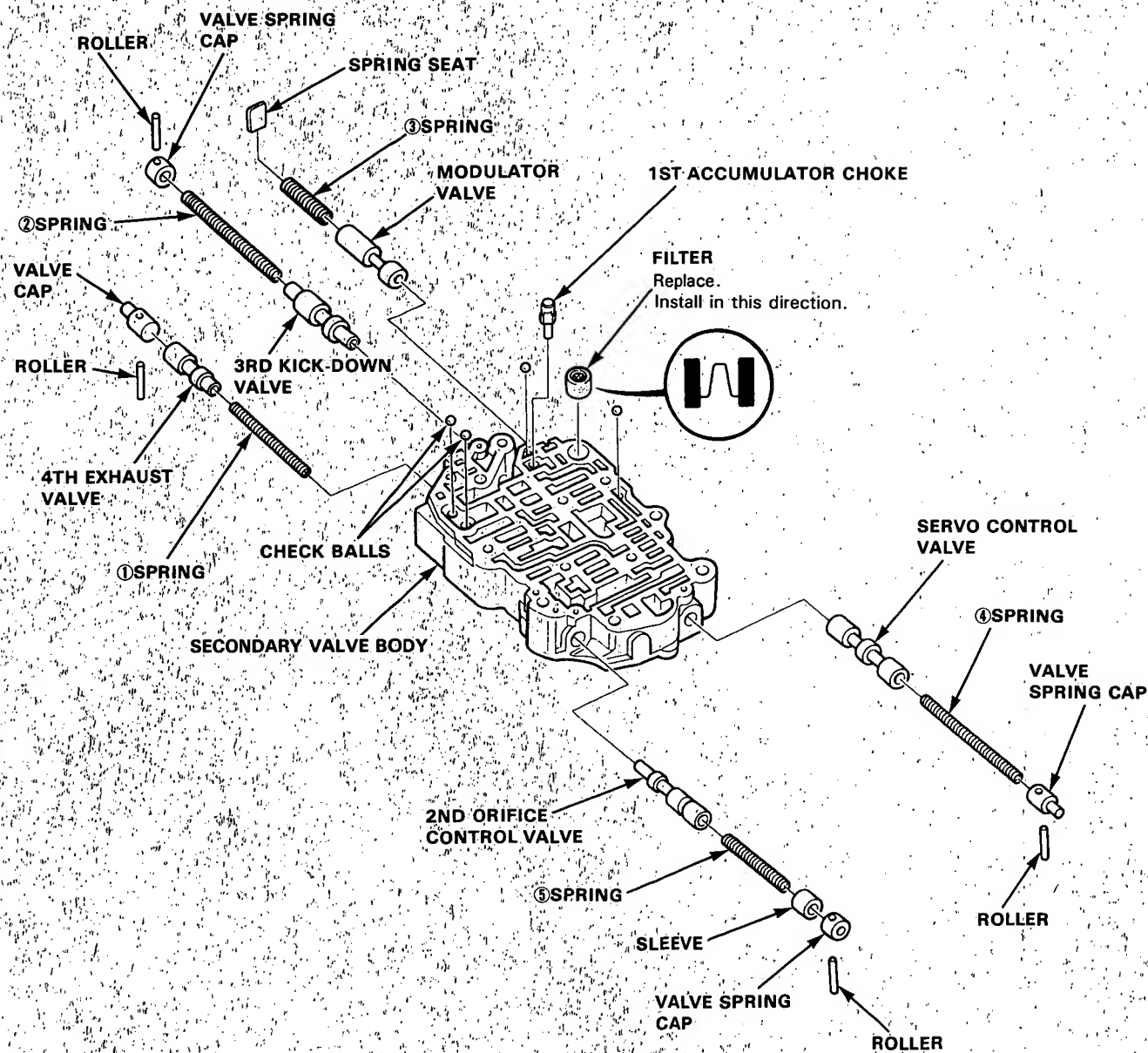
# Secondary Valve Body

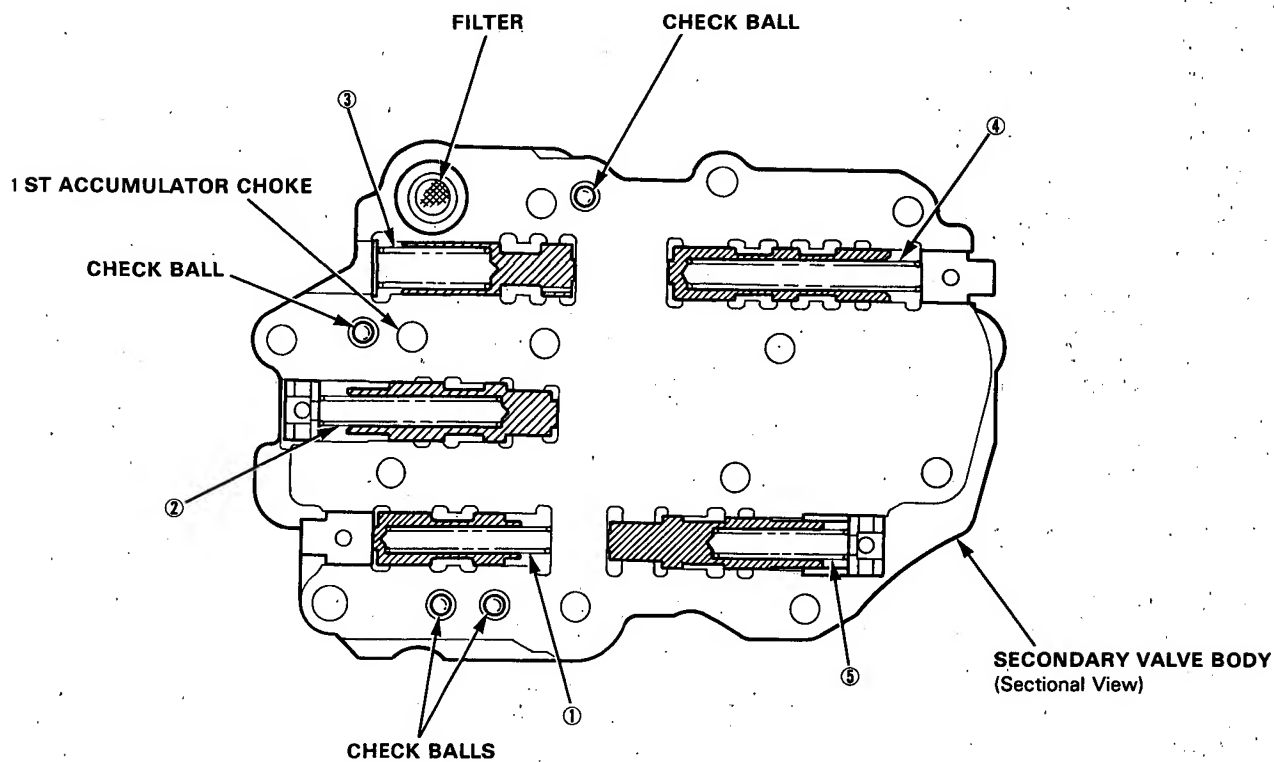
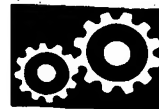
## Disassembly/Inspection/Reassembly

### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check all valves for free movement. If any fail to slide freely, see Valve Body Repair on page 14-90.
- Replace as an assembly if any parts are worn or damaged.

**CAUTION:** Do not use a magnet to remove the check balls, it may magnetize the balls.





### Spring Specifications

Unit of length: mm (in)

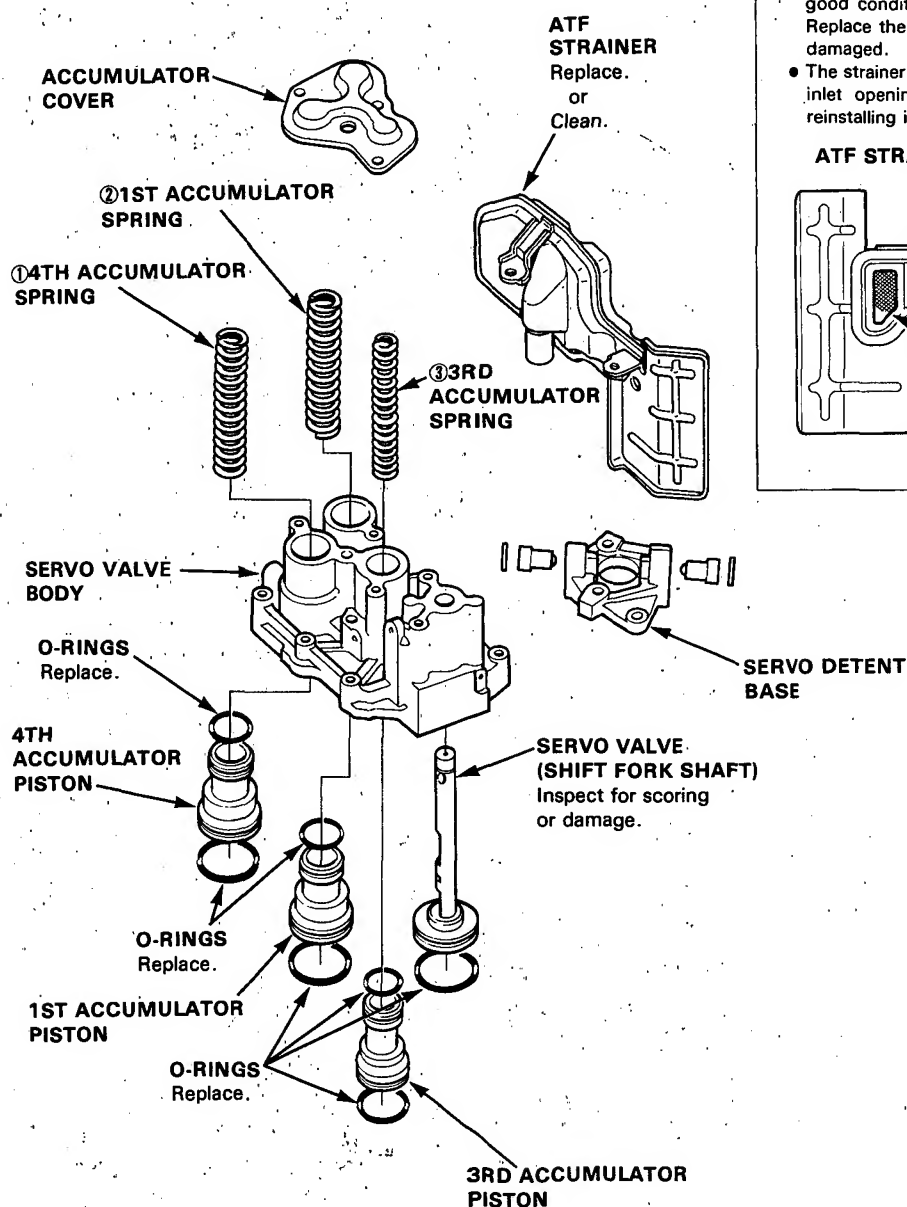
No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	4th exhaust valve spring	0.8(0.031)	5.6(0.220)	54.2(2.134)	32.0
②	3rd kick-down valve spring	1.0(0.039)	6.6(0.260)	55.4(2.181)	27.0
③	Modulator valve spring	1.5(0.059)	9.4(0.370)	30.6(1.205)	9.9
④	Servo control valve spring	1.0(0.039)	6.6(0.260)	74.7(2.941)	36.4
⑤	2nd orifice control valve spring	0.8(0.031)	6.6(0.260)	54.1(2.130)	32.5

# Servo Valve Body

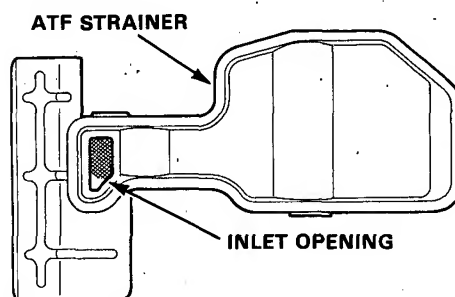
## Disassembly/Inspection/Reassembly

### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
- Blow out all passages.
- Replace valve body as an assembly if any parts are worn or damaged.
- Check all valves for free movement. If any fail to slide freely, see Valve Body Repair on page 14-90.
- Coat all parts with ATF before reassembly.
- Replace the O-rings.



- After disassembling the ATF strainer, check that it is in good condition, and the inlet opening is not clogged. Replace the strainer with a new one if it is clogged or damaged.
- The strainer can be reused if it is not clogged. Clean the inlet opening thoroughly with compressed air before reinstalling it.



### Spring Specifications

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	4th accumulator spring	2.7(0.106)	18.4(0.724)	78.5(3.091)	8.5
②	1st accumulator spring	3.0(0.118)	18.6(0.732)	80.7(3.177)	14.8
③	3rd accumulator spring	2.6(0.102)	17.0(0.669)	80.2(3.157)	13.7

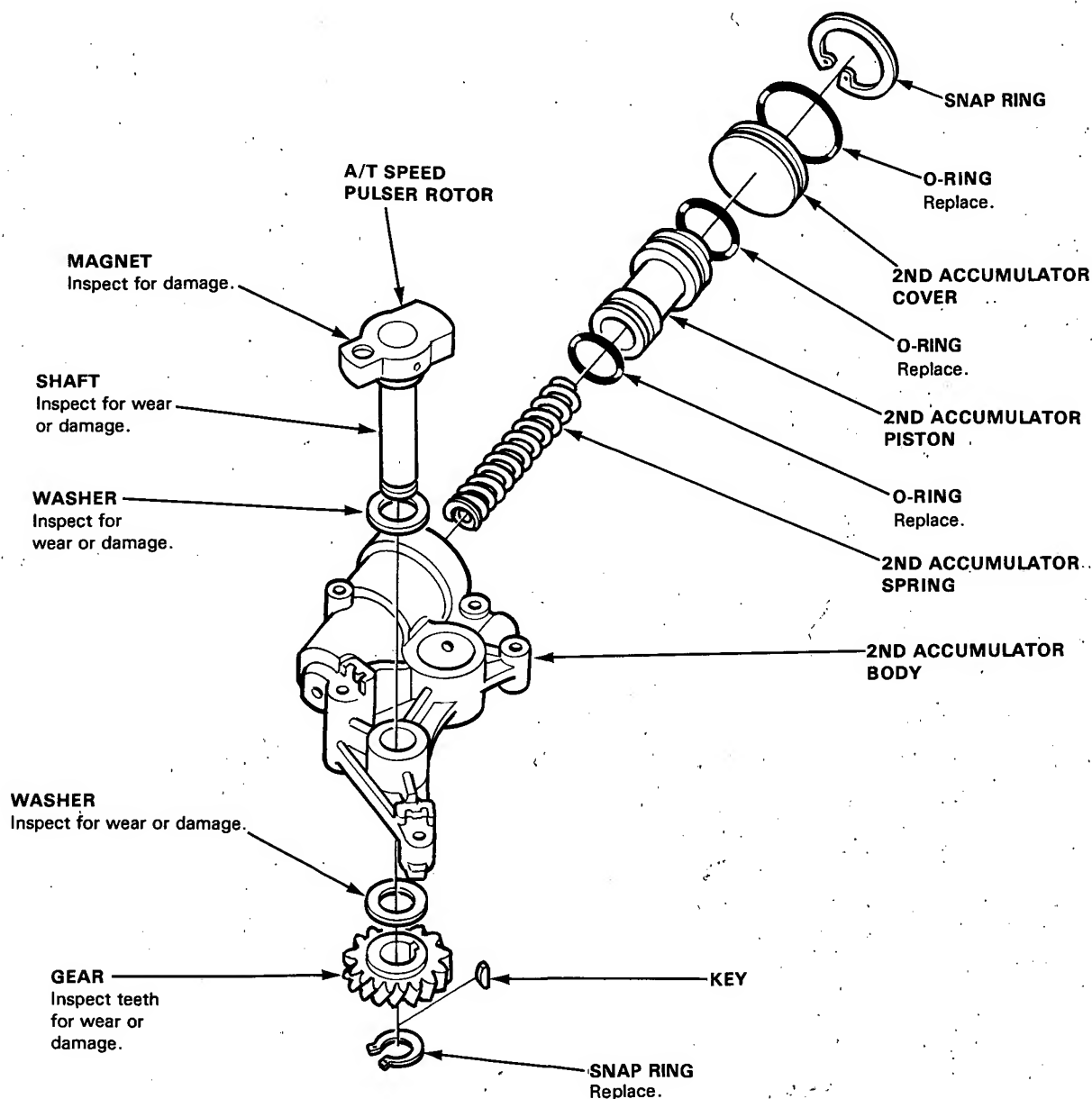
# 2nd Accumulator Body



## Disassembly/Inspection/Reassembly

### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check all valves for free movement. If any fail to slide freely, see Valve Body Repair on page 14-90.



### Spring Specifications

Unit of length: mm (in)

Spring	Standard (New)			
	Wire Dia.	O.D.	Free Length	No. of Coils
2nd accumulator spring	3.3(0.130)	20.0(0.787)	77.5(3.051)	10.9

# Mainshaft

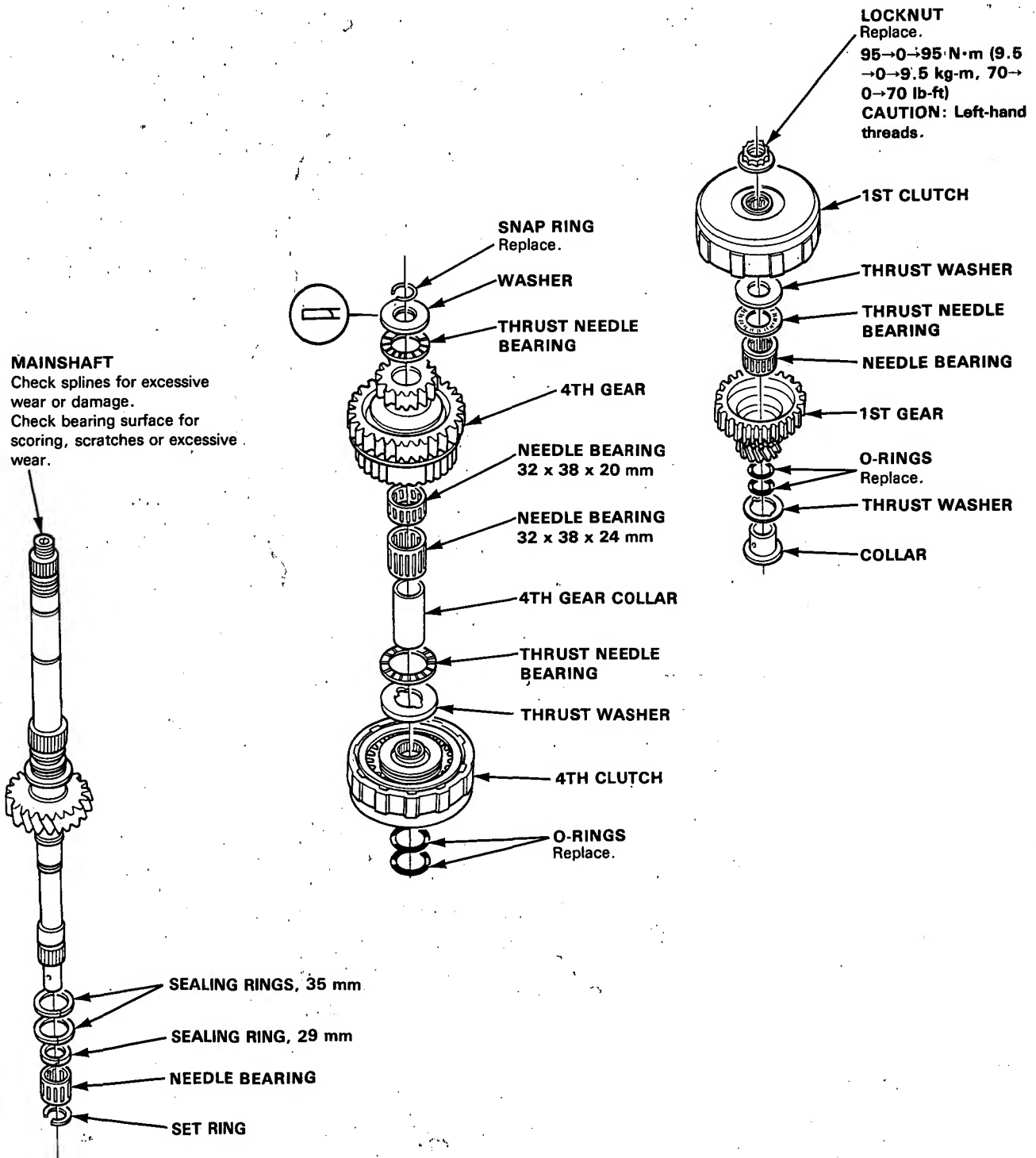
## Disassembly/Inspection/Reassembly

### NOTE:

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
- Inspect the needle bearings and the thrust needle bearings for galling and rough movement.
- Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.

### MAINSHAFT

Check splines for excessive wear or damage.  
Check bearing surface for scoring, scratches or excessive wear.



# Countershaft



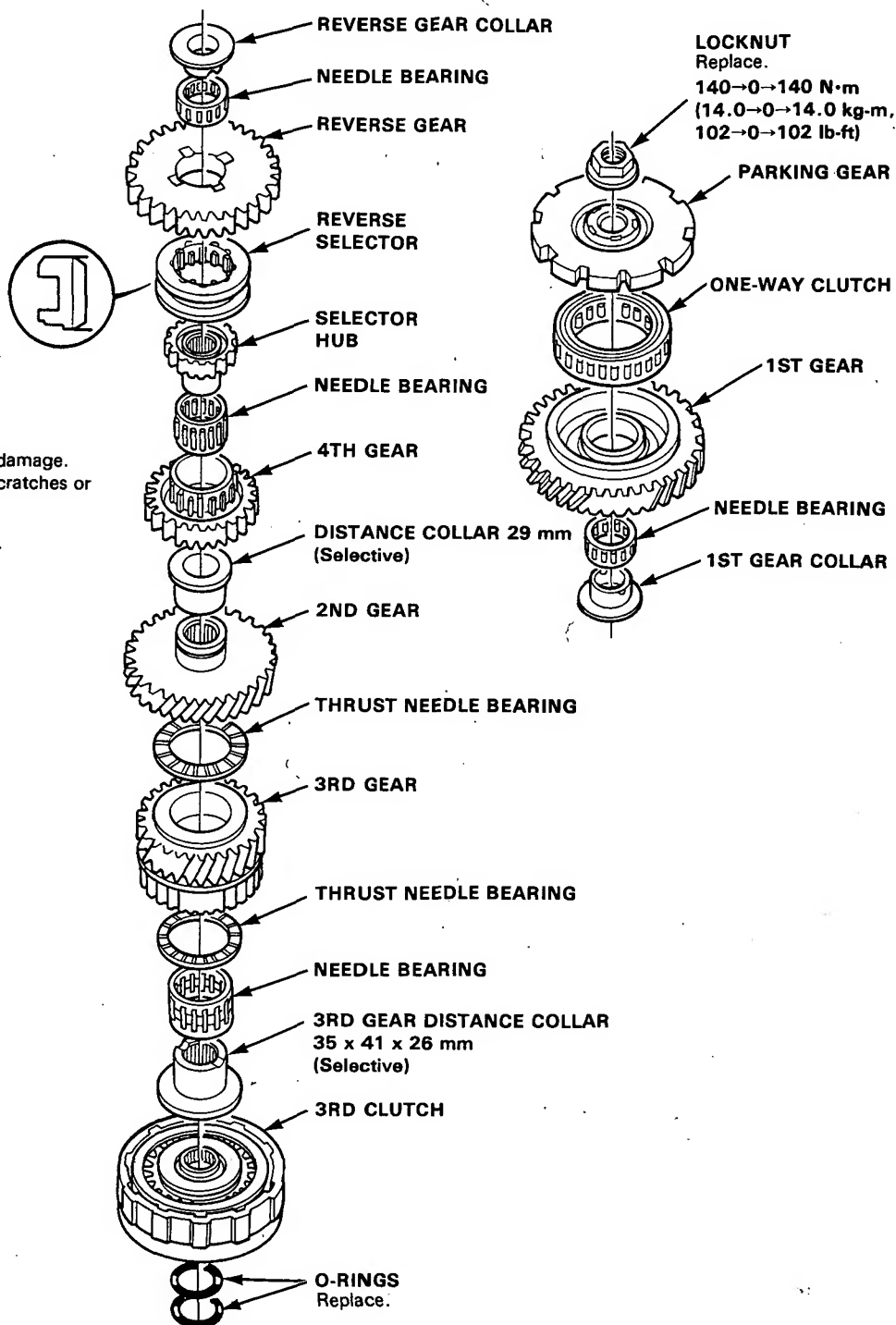
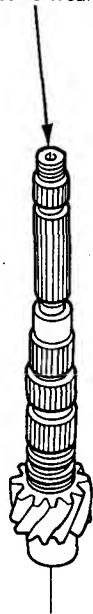
## Disassembly/Inspection/Reassembly

### NOTE:

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
- Inspect the needle bearings and the thrust needle bearings for galling and rough movement.
- Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.

### COUNTERSHAFT

Check splines for excessive wear or damage.  
Check bearing surface for scoring, scratches or excessive wear.

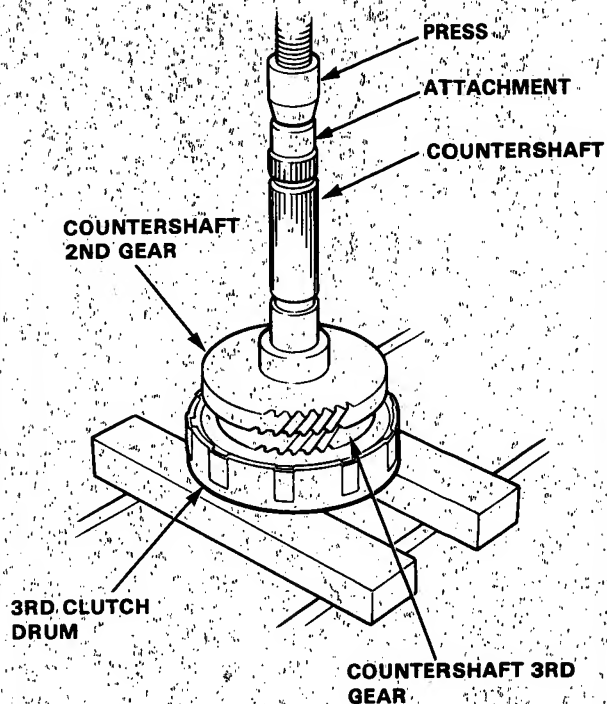


# Countershaft

## Removal

1. Using a press, press out the countershaft while supporting the 3rd clutch drum.

NOTE: Place an attachment between the press and countershaft to prevent damage to the shaft.



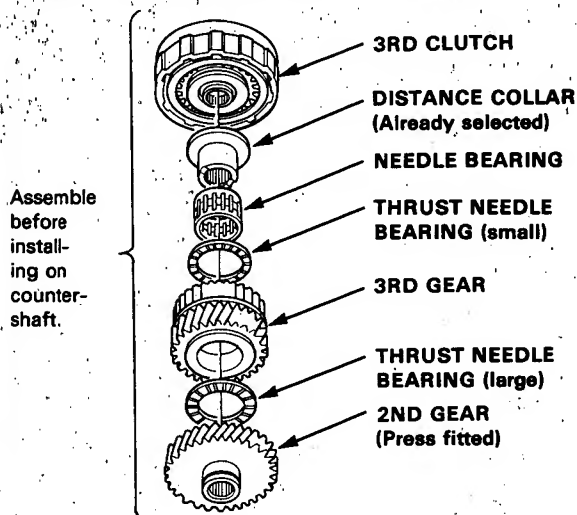
## Installation

NOTE: Lubricate all parts with ATF during reassembly.

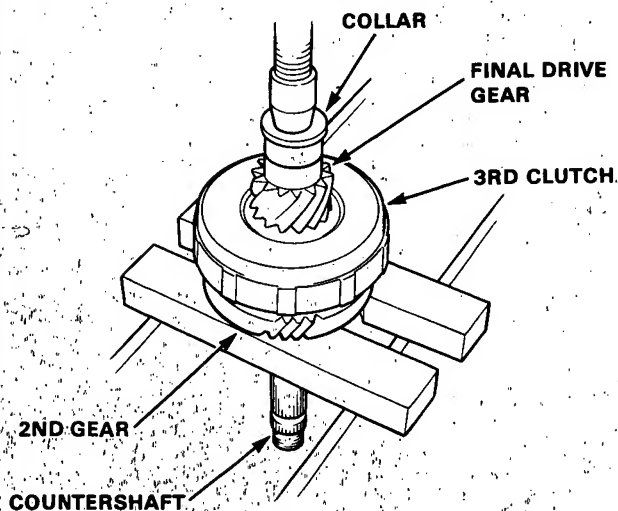
1. Install two new O-rings on the countershaft.

NOTE: Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.

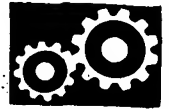
2. Assemble the 3rd clutch, distance collar (selected), needle bearing, small thrust needle bearing, 3rd gear, large thrust needle bearing, and 2nd gear.



3. Install the above assembly on the countershaft.
4. With the shaft splines aligned with those of the 2nd gear, press the countershaft into the 2nd gear in a press.  
NOTE:
  - Also align the shaft splines with those of the 3rd clutch when pressing the countershaft into the 2nd gear.
  - Use an old collar between the shaft end and press to prevent damage to the countershaft.
  - Stop pressing the countershaft when the 3rd clutch contacts the final drive gear.



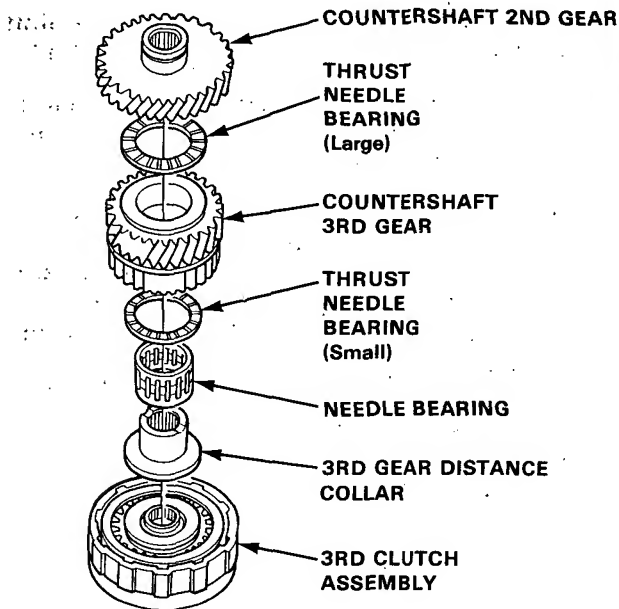




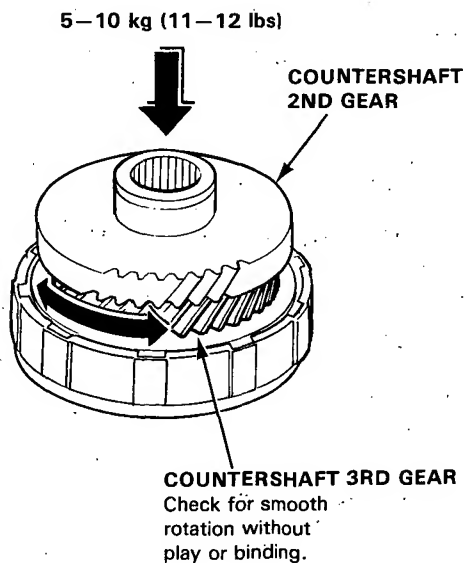
## Clearance Measurements

### ● Selection of the 3rd Gear Distance Collar

1. Assemble the parts below on the 3rd clutch assembly.



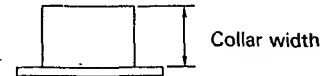
2. With the 3rd clutch assembly held stationary, hold the countershaft 2nd gear against the 3rd clutch assembly with a force of 5–10 kg (11–12 lbs).
3. Spin the countershaft 3rd gear by hand to check for clearances. The clearances are considered normal if it turns freely without binding.



### NOTE:

- If the 3rd gear binds, or turns sluggish, the clearances are too small.
- If there is play in the shaft direction, the clearances are excessive.

4. If the clearances are too small or excessive, measure the distance collar and select the appropriate distance collar using table below. Then install it and recheck.



### 3RD GEAR DISTANCE COLLAR

No.	Part No.	Collar Width mm(in)
1	90498-PRO-000	25.955–25.970 (1.0218–1.0224)
2	90499-PRO-000	25.970–25.985 (1.0224–1.0230)
3	90500-PRO-000	25.985–26.000 (1.0230–1.0236)
4	90501-PRO-000	26.000–26.015 (1.0236–1.0242)
5	90511-PRO-000	26.015–26.030 (1.0242–1.0248)
6	90512-PRO-000	26.030–26.045 (1.0248–1.0254)

NOTE: If the clearances are too small or excessive after replacing the 3rd gear distance collar, check the countershaft 3rd gear, countershaft 2nd gear, 3rd, gear distance collar, thrust needle bearings, and needle bearing for wear. Replace any worn parts.

# Countershaft

## Clearance Measurements

### ● Selection of the Distance Collar 29 mm

1. Remove the countershaft bearing from the transmission housing. (see page 14-121.)

2. Assemble the countershaft including the bearing and all parts shown on page 14-103.

NOTE: Lubricate all parts with ATF before final reassembly.

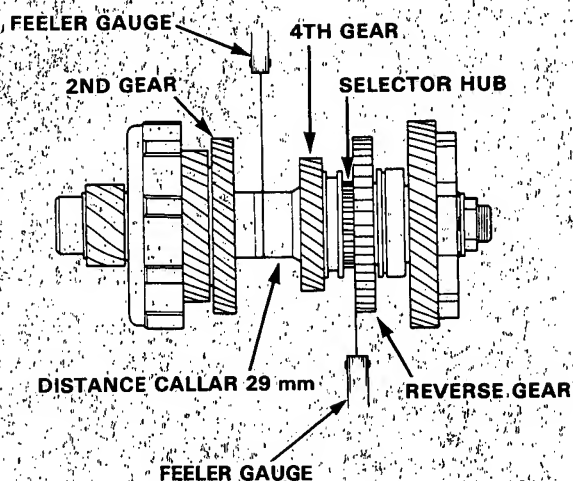
3. Hold the parking gear on the countershaft with your hand and torque the countershaft locknut to 30 N·m (3.0 kg-m, 22 lb-ft).

4. Hold the selector hub firmly against the countershaft 4th gear, insert a feeler gauge between the countershaft reverse gear and selector hub to keep the hub in contact with the countershaft 4th gear.

5. Measure the clearance of the countershaft 2nd gear with a feeler gauge.

NOTE: Take measurements in at least three places, and take the average as the actual clearance.

Standard: 0—0.04 mm (0—0.0016 in)



### FEELER GAUGE

\*Use gauge of maximum thickness.

### COUNTERSHAFT REVERSE GEAR

### FEELER GAUGE

### 4TH GEAR

### BALL BEARING

### COUNTERSHAFT 2ND GEAR

### DISTANCE COLLAR 29 mm (Selective Fit)

\*Press firmly against countershaft 2nd gear.

### SELECTOR HUB

\*Press firmly against 29 mm distance collar by inserting thickness gauge between hub and counter reverse gear.

6. If the clearance is out of tolerance, measure the length of the distance collar used, then select one which will bring the clearance within the specified limits.

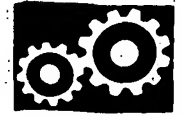
### DISTANCE COLLAR 29 mm:

No.	Part No.	Collar Length mm (in)
1	90503-PR0-030	23.08-23.10(0.9087-0.9094)
2	90504-PR0-030	23.10-23.12(0.9094-0.9102)
3	90505-PR0-030	23.12-23.14(0.9102-0.9110)
4	90506-PR0-030	23.14-23.16(0.9110-0.9118)
5	90507-PR0-030	23.16-23.18(0.9118-0.9126)
6	90508-PR0-030	23.18-23.20(0.9126-0.9134)
7	90509-PR0-030	23.20-23.22(0.9134-0.9142)
8	90531-PR0-010	23.22-23.24(0.9142-0.9150)
9	90532-PR0-010	23.24-23.26(0.9150-0.9157)
10	90533-PR0-010	23.26-23.28(0.9157-0.9165)
11	90534-PR0-010	23.28-23.30(0.9165-0.9173)
12	90535-PR0-010	23.30-23.32(0.9173-0.9181)
13	90536-PR0-010	23.32-23.34(0.9181-0.9189)
14	90537-PR0-010	23.34-23.36(0.9189-0.9197)
15	90538-PR0-010	23.36-23.38(0.9197-0.9205)
16	90539-PR0-010	23.38-23.40(0.9205-0.9213)

### NOTE:

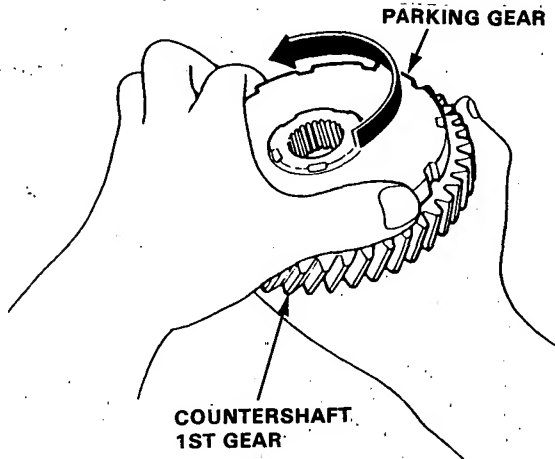
- After replacing the distance collar 29mm, make sure that the clearance is within tolerance.
- If the clearance still exceeds the limit even when the shortest distance collar is installed, check the countershaft 2nd gear and distance collar 29mm for wear. Replace any worn parts.

# One-way Clutch/Parking Gear

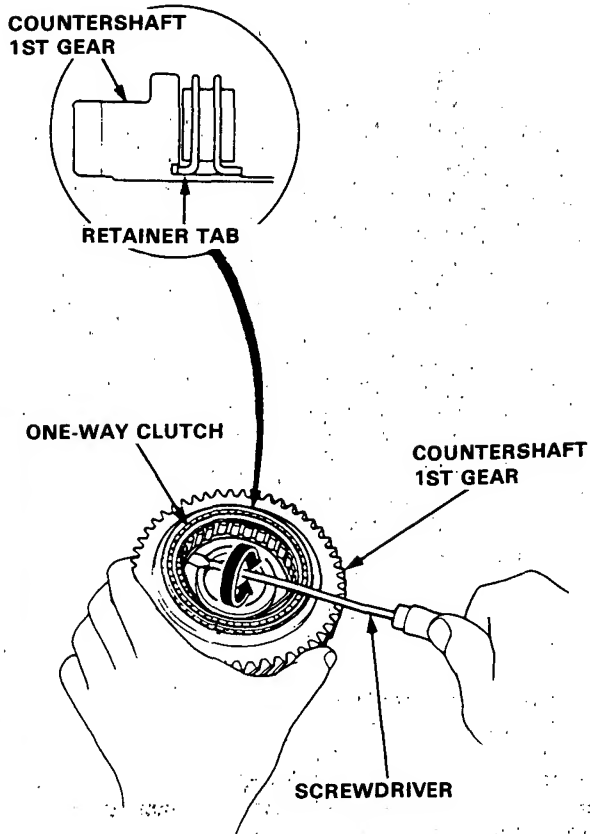


## Disassembly and Inspection

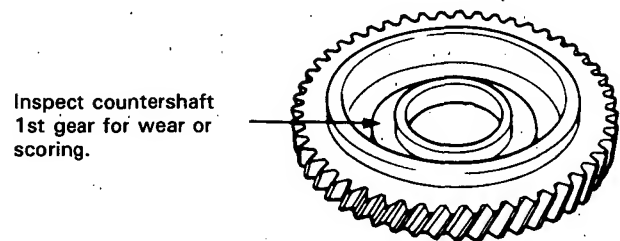
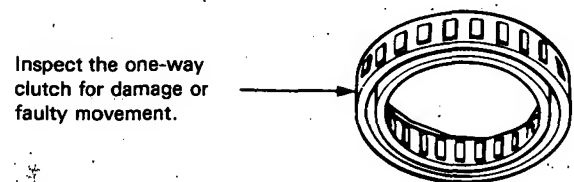
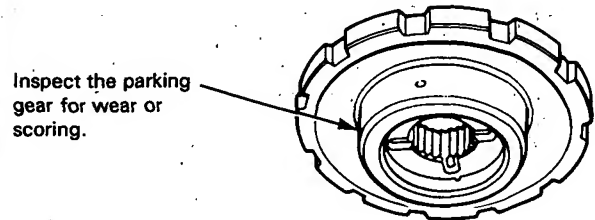
1. Separate countershaft 1st gear from the parking gear by turning the parking gear in the direction shown.



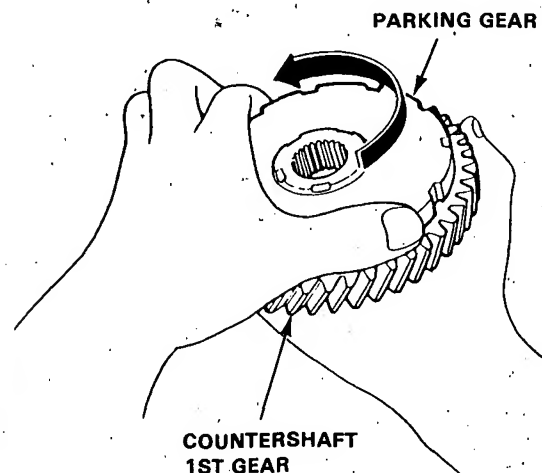
2. Remove the one-way clutch by prying it up with the end of a screwdriver.



Inspect the parts as follows:



3. After the parts are assembled, hold countershaft 1st gear and turn the parking gear in the direction shown to be sure it turns freely.

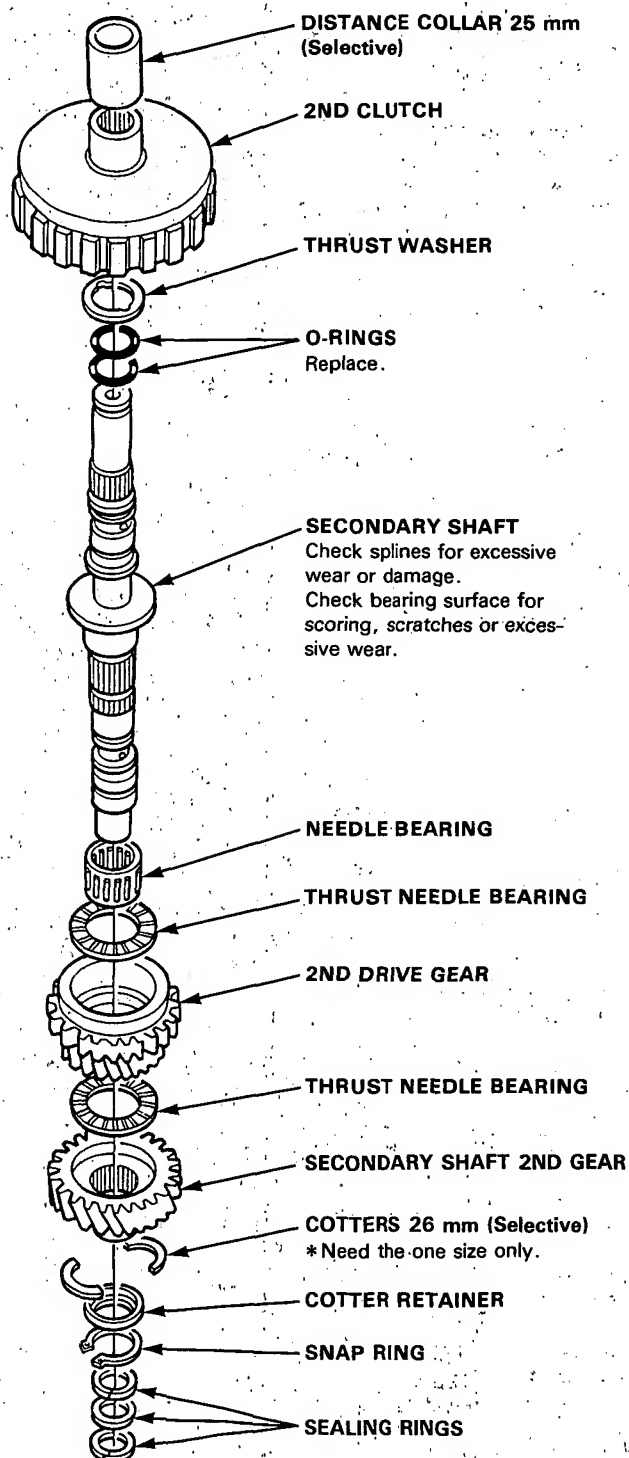


# Secondary Shaft

## Disassembly/Inspection/Reassembly

### NOTE:

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
- Inspect the needle bearings and the thrust needle bearings for galling and rough movement.
- Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.





## Clearance Measurement

### ● Selection of the cotter 26 mm

1. Install the needle bearing thrust needle bearing, 2nd drive gear, 2nd gear, and cotters.

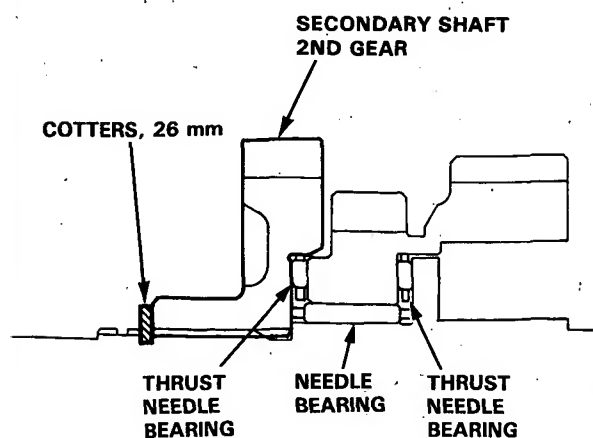
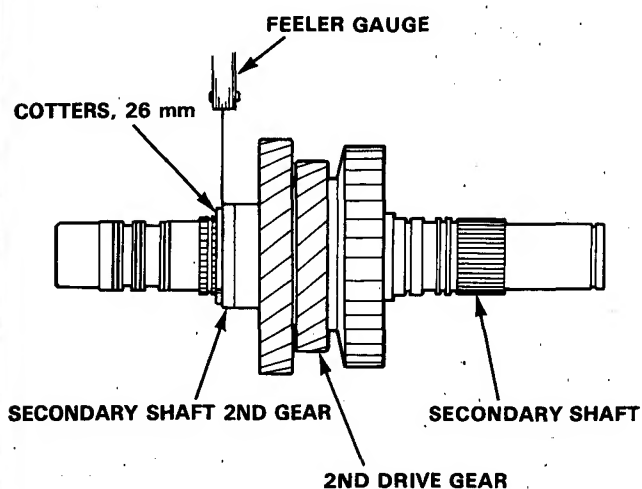
**CAUTION:** Never use cotters of different thicknesses on a shaft.

**NOTE:** Seat the cotters in the groove properly.

2. Measure the clearance between the 2nd gear and cotters with a feeler gauge.

**NOTE:** Take measurements in at least three places, and take the average as the actual clearance.

**Standard:** 0–0.08 mm (0–0.003 in)



3. If the clearance is out of tolerance, measure the thickness of cotters and select one which will give the proper clearance.

### COTTER 26 mm:

No.	Part No.	Thickness
1	90428-PRO-000	2.00 mm(0.0787 in)
2	90429-PRO-010	2.05 mm(0.0807 in)
3	90430-PRO-010	2.10 mm(0.0827 in)
4	90431-PRO-020	2.15 mm(0.0846 in)

**NOTE:** After replacing the cotters, make sure that the clearance is within tolerance.

# Secondary Shaft

## Clearance Measurement

### • Selection of the Distance Collar 25 mm

1. Assemble the secondary shaft assembly (see page 14-108).
2. Install the secondary shaft assembly in the torque converter housing.

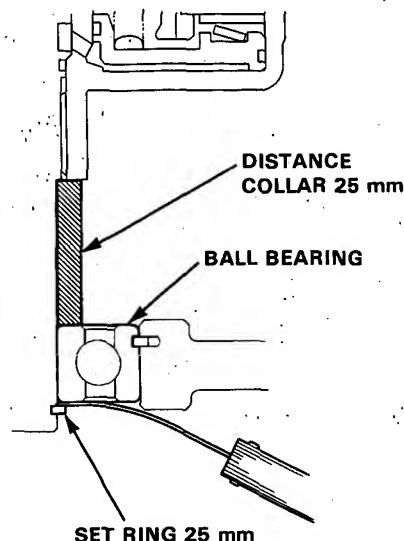
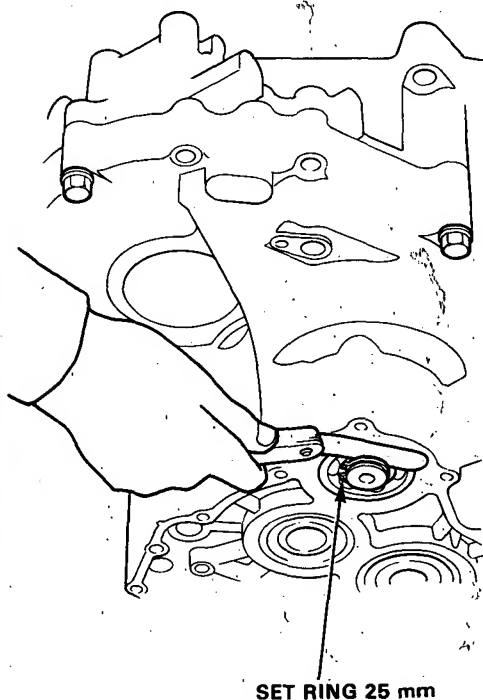
NOTE: It is not necessary to install the countershaft, mainshaft, etc., at this time.

3. Place a new gasket on the torque converter housing, and install the transmission housing.
4. Install four or five bolts around the secondary shaft and tighten to the specified torque.

**Torque: 55 N · m (5.5 kg-m, 40 lb-ft)**

5. Install the set ring 25 mm.
6. Place the transmission upside down.
7. Measure the clearance between the set ring 25 mm and secondary shaft ball bearing.

**Standard: 0—0.08 mm (0—0.003 in)**



8. If the clearance is out of tolerance, disassemble the transmission and measure the distance collar 25 mm, then select one which will give the proper clearance.

### DISTANCE COLLAR 25 mm:

No.	Part No.	Length
1	90513-PR0-850	28.85 mm(1.136 in)
2	90514-PR0-850	28.90 mm(1.138 in)
3	90515-PR0-850	28.95 mm(1.140 in)
4	90516-PR0-850	29.00 mm(1.142 in)
5	90517-PR0-850	29.05 mm(1.144 in)
6	90518-PR0-850	29.10 mm(1.146 in)
7	90519-PR0-850	29.15 mm(1.148 in)
8	90520-PR0-850	29.20 mm(1.150 in)
9	90521-PR0-850	29.25 mm(1.152 in)
10	90522-PR0-850	29.30 mm(1.154 in)

### NOTE:

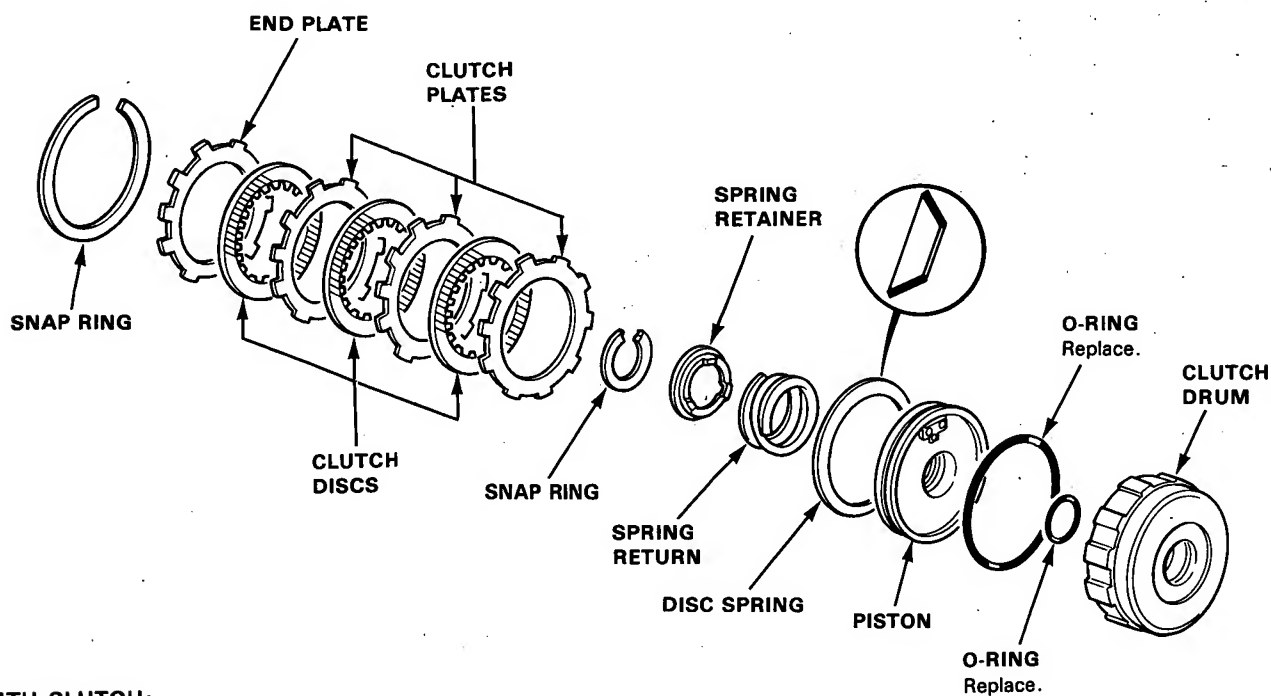
- After replacing the distance collar 25 mm, make sure that the clearance is within tolerance.
- If the clearance still exceeds the limit even when the shortest or longest distance collar is installed, check the 2nd clutch assembly and distance collar 25 mm for wear. Replace any worn parts.



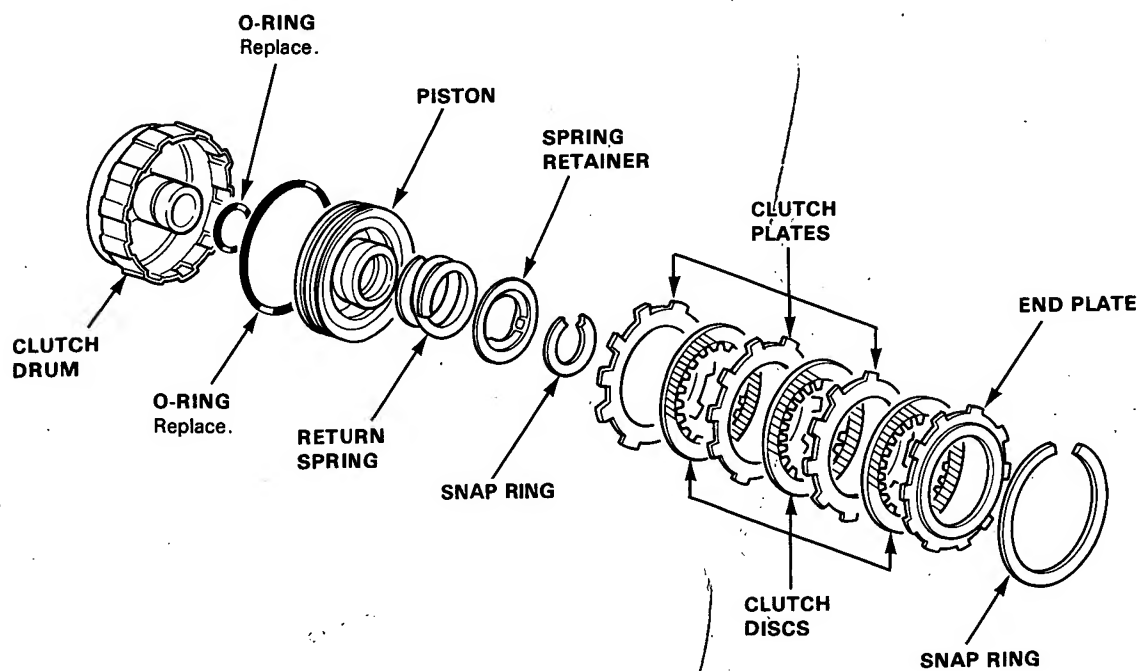
# Clutch

## Illustrated Index

### 1ST CLUTCH:



### 4TH CLUTCH:

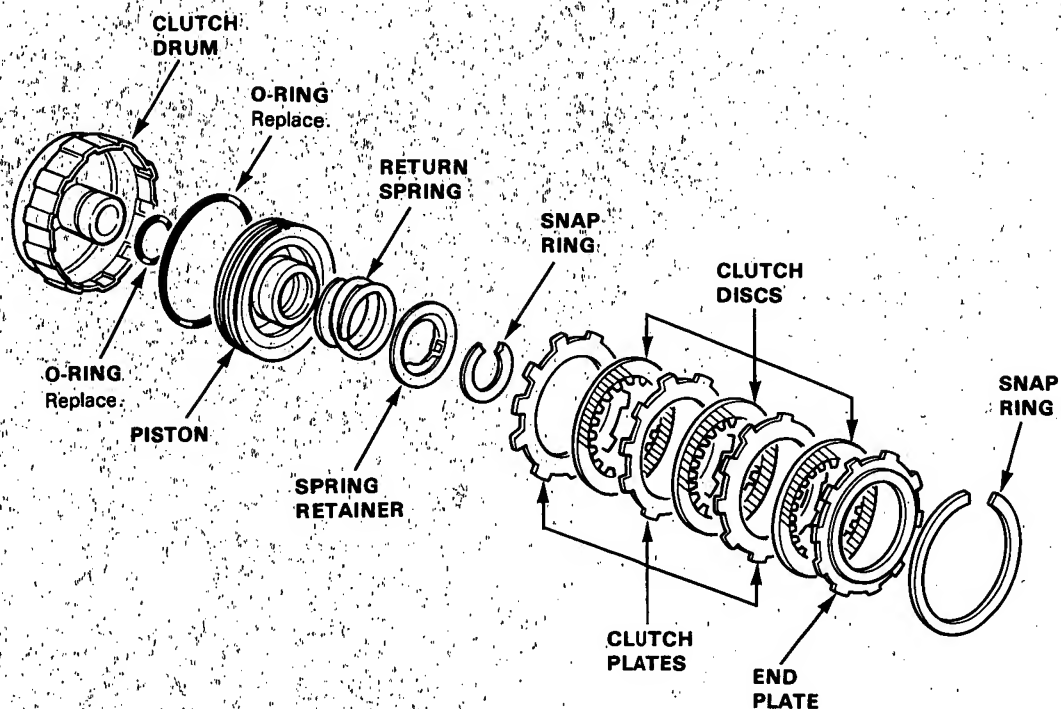


(cont'd)

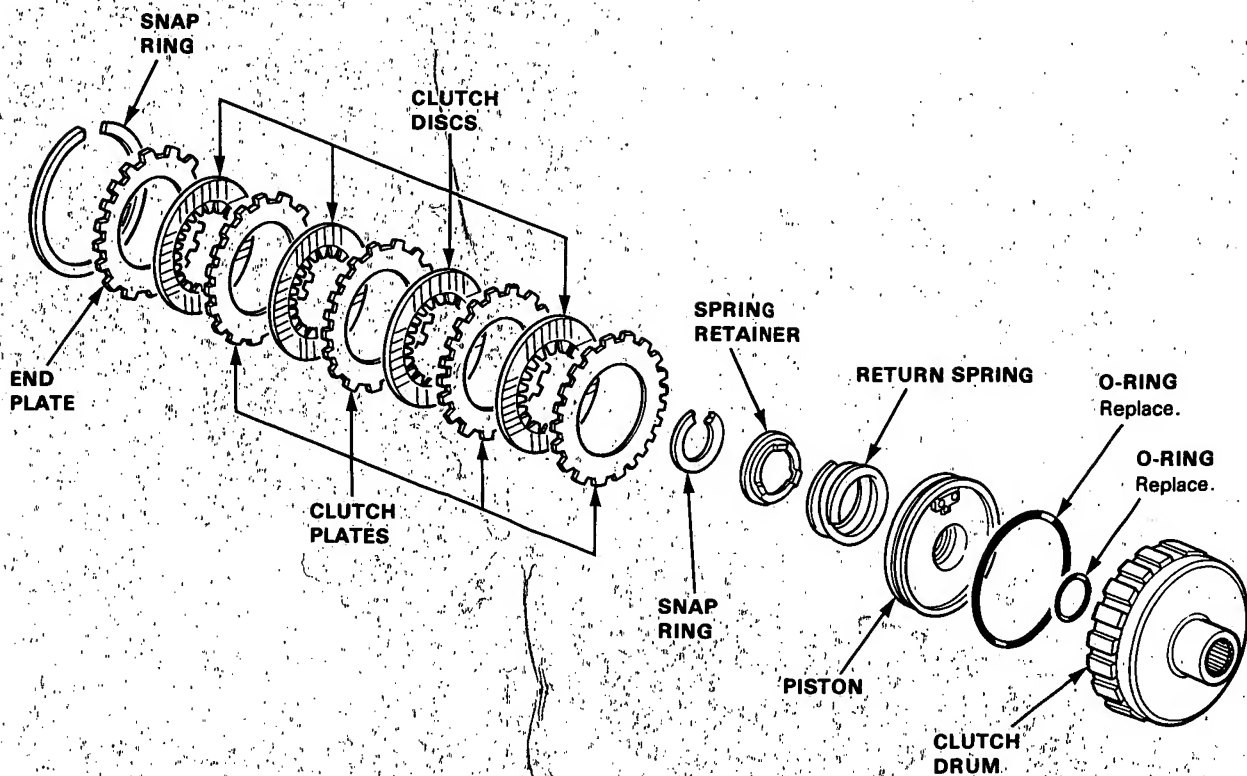
# Clutch

## Illustrated Index (cont'd)

### 3RD CLUTCH:



### 2ND CLUTCH:

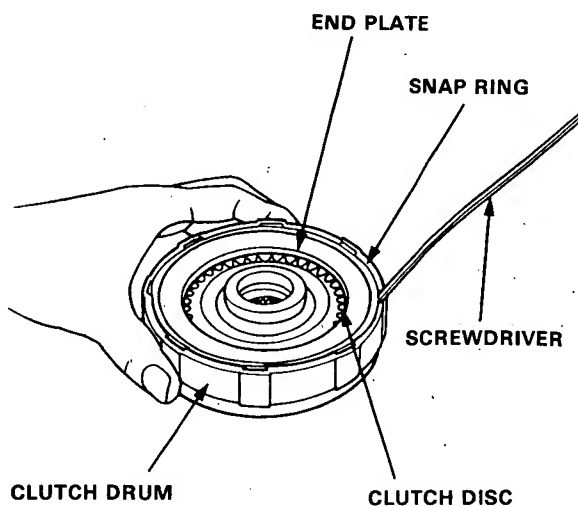




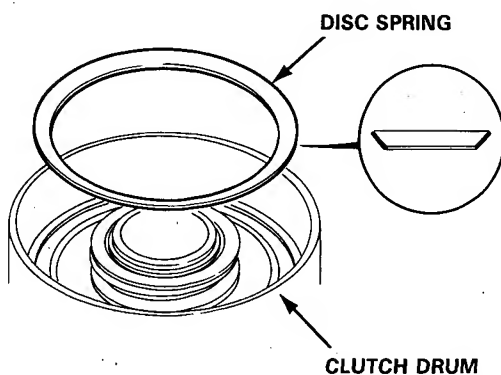


## Disassembly

1. Remove the snap ring.
  2. Remove the end plate, clutch discs and plates.
- NOTE: For all clutches.

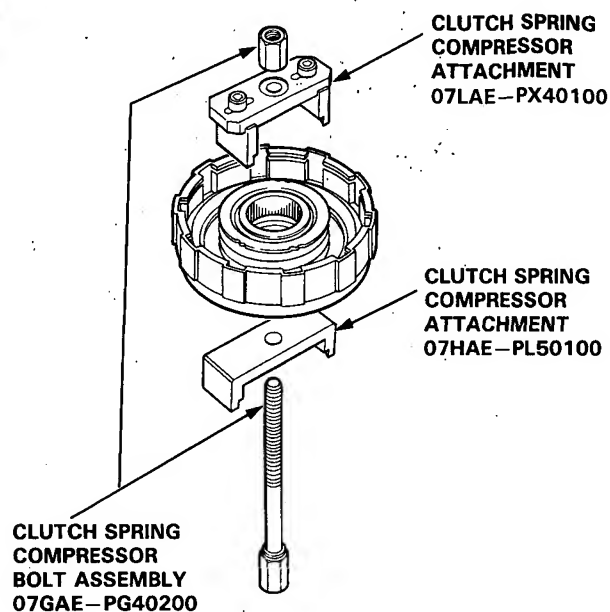


3. Remove the disc spring.
- NOTE: For 1st clutch.

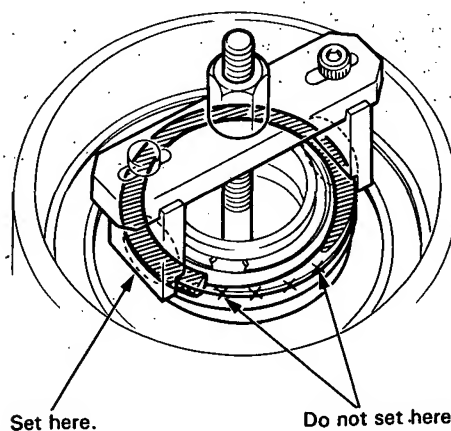


NOTE: Steps 4 thru 7 are for all clutches.

4. Install the special tools as shown to compress the clutch return spring.



**CAUTION:** If either end of the compressor attachment is set over an area of the retainer which is unsupported by the spring, the retainer may be damaged.

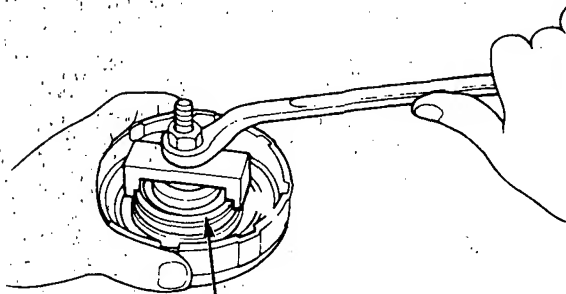


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# Clutch

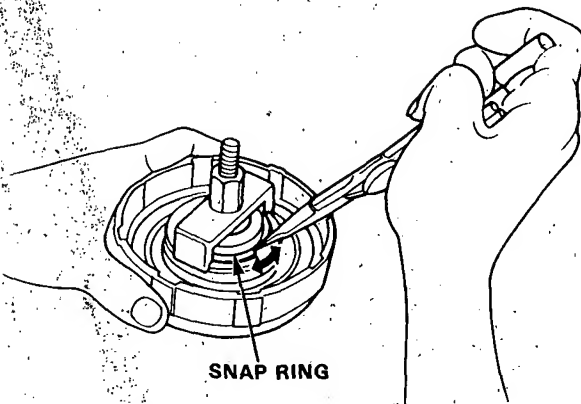
## Disassembly (cont'd)

5. Compress the clutch return spring.



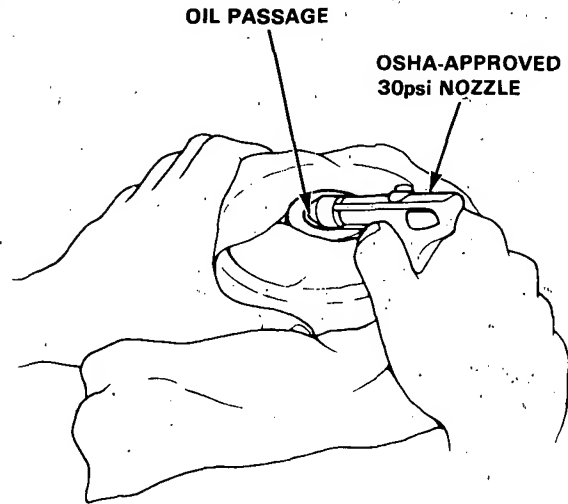
CLUTCH RETURN SPRING

6. Remove the snap ring. Then remove the special tools, spring retainer and return spring.



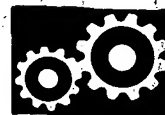
SNAP RING

7. Wrap a shop rag around the clutch drum and apply air pressure to the oil passage to remove the piston. Place a finger tip on the other end while applying air pressure.



OIL PASSAGE

OSHA-APPROVED  
30psi NOZZLE

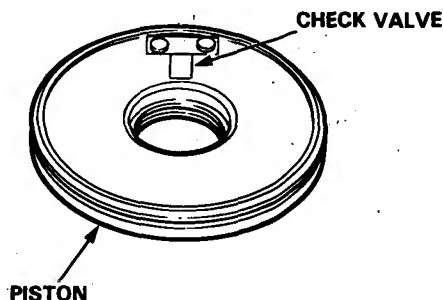


## Reassembly

### NOTE:

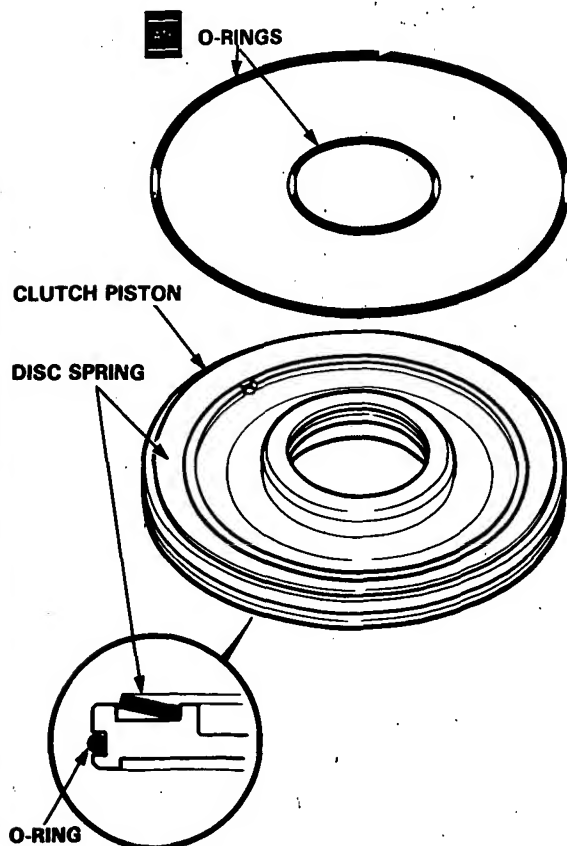
- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
- Blow out all passages.
- Lubricate all parts with ATF before reassembly.

1. Inspect the check valve; if it's loose, replace the piston.



2. Install new O-rings on the clutch piston.
3. Be sure that the disc spring is securely staked.

NOTE: For 2nd, 3rd and 4th clutches.

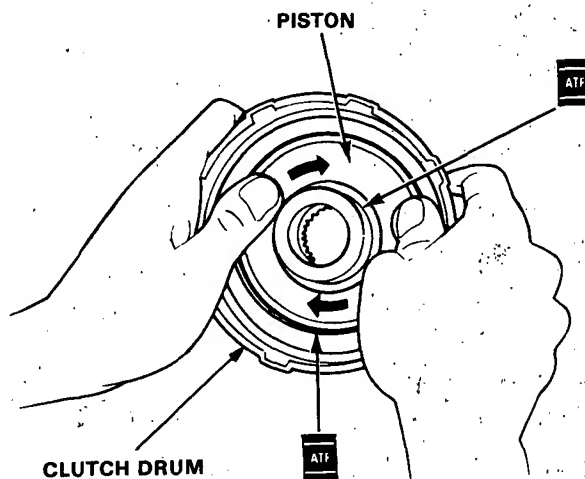


4. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

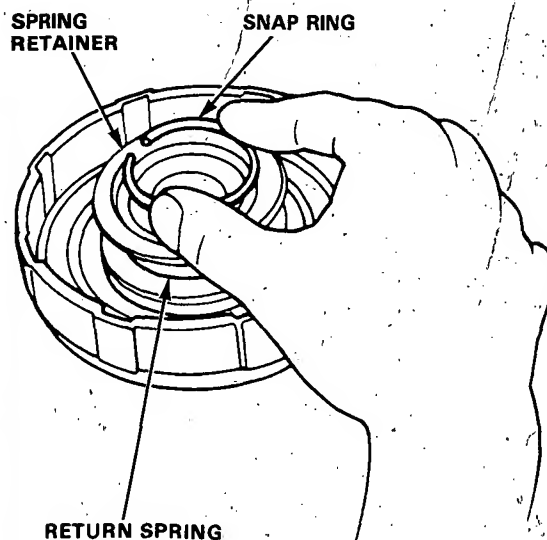
### NOTE:

- For all clutches.
- Lubricate the piston O-ring with ATF before installing.

**CAUTION:** Do not pinch O-ring by installing the piston with force.



5. Install the return spring and spring retainer and position the snap ring on the spring retainer.



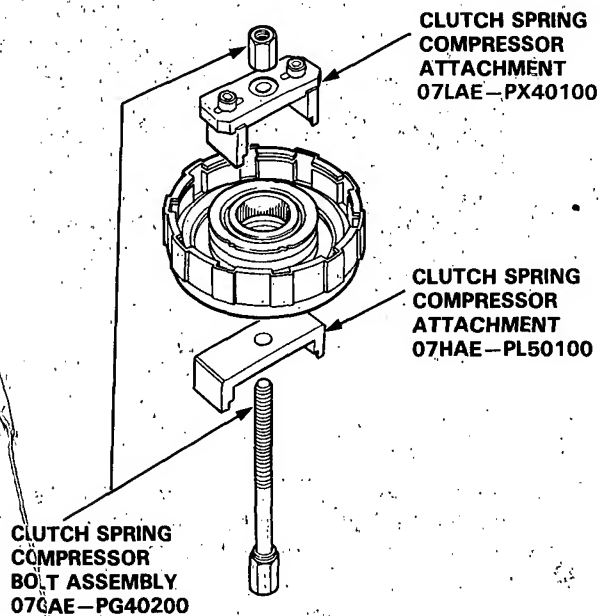
(cont'd)

# Clutch

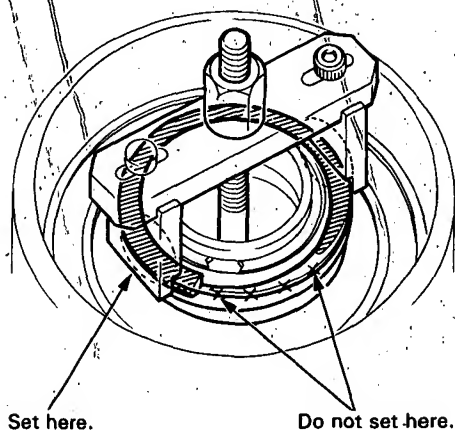
## Reassembly (cont'd)

NOTE: Step 6 thru 9 are for all clutches.

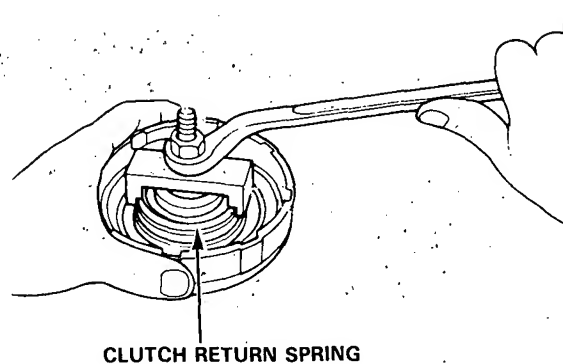
6. Install the special tools on the clutch drum and compress the clutch return spring.



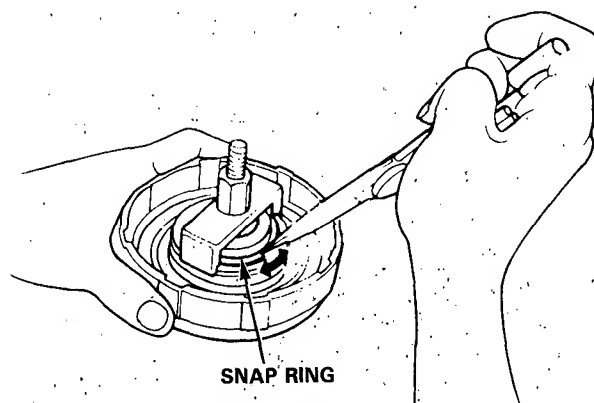
**CAUTION:** If either end of the compressor attachment is set over an area of the spring retainer which is unsupported by the return spring, the spring retainer may be damaged.



7. Compress the clutch return spring.



8. Install the snap ring.
9. Remove the special tools.

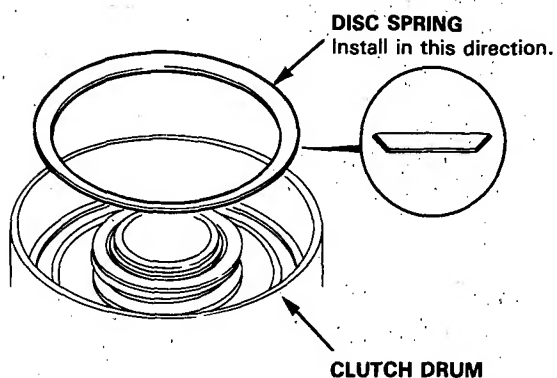




10. Install the disc spring.

NOTE:

- For 1st clutch only.
- Install the disc spring in the direction shown.

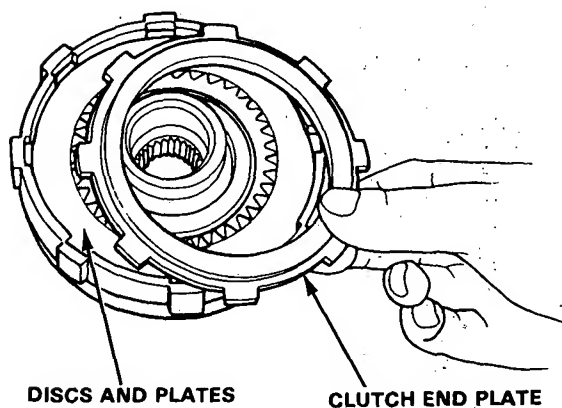


NOTE: Steps 11 thru 16 are for all clutches.

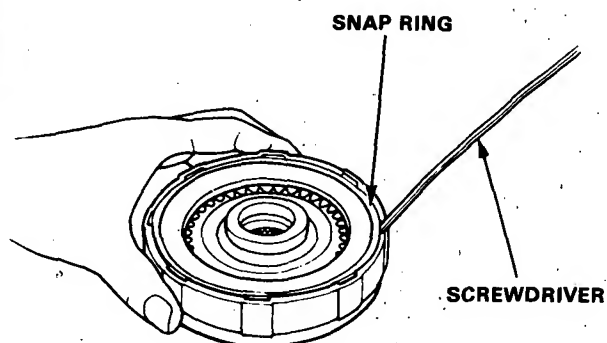
11. Soak the clutch discs thoroughly in ATF for a minimum of 30 minutes.

12. Starting with a clutch plate, alternately install the clutch plates and discs. Install the clutch end plate with flat side toward the inside.

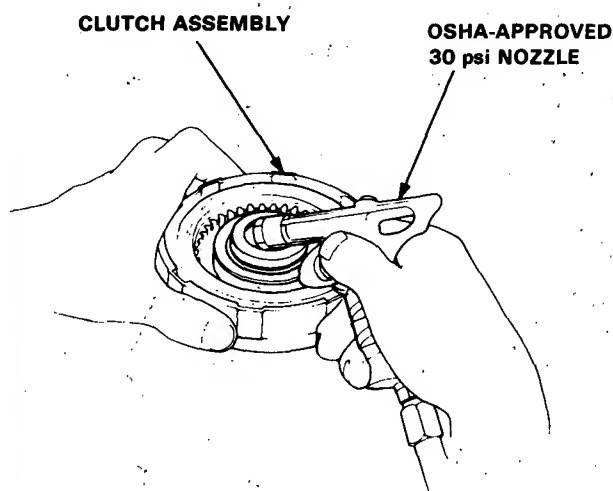
NOTE: Before installing the plates and discs, make sure the inside of the clutch drum is free of dirt or other foreign matter.



13. Install the snap ring.



14. Check the clutch engagement by blowing air into the oil passage in the clutch drum hub. Remove the air pressure and check that the clutch releases.



(cont'd)

# Clutch

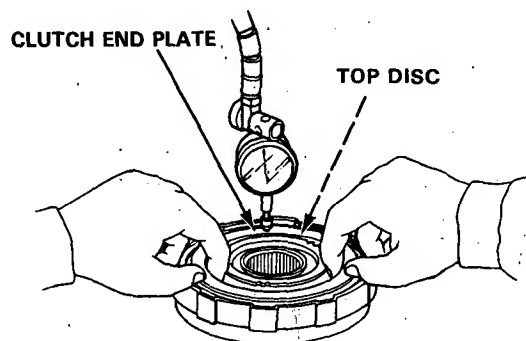
## Reassembly (cont'd)

15. Measure the clearance between the clutch end plate and top disc with a dial indicator. Zero the dial indicator with the clutch end plate lowered and lift it up to the snap ring. The distance that the clutch end plate moves is the clearance between the clutch end plate and top disc.

NOTE: Measure at three locations.

### Clutch End Plate-to-Top Disc Clearance:

	Service Limit	
1st	0.65–0.85 mm	(0.026–0.033 in.)
2nd	0.50–0.70 mm	(0.020–0.028 in.)
3rd	0.40–0.60 mm	(0.016–0.024 in.)
4th	0.40–0.60 mm	(0.016–0.024 in.)

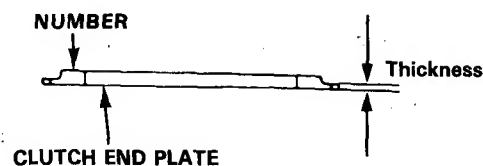


16. If the clearance is not within the service limits, select a new clutch end plate from the following table.

NOTE: If the thickest clutch end plate is installed but the clearance is still over the standard, replace the clutch discs and clutch plates.

### CLUTCH END PLATE

	Part No.	Plate No.	Thickness mm (in.)
1st, 3rd and 4th	22551-PF4-000	1	2.1 (0.082)
	22552-PF4-000	2	2.2 (0.086)
	22553-PF4-000	3	2.3 (0.090)
	22554-PF4-000	4	2.4 (0.094)
	22555-PF4-000	5	2.5 (0.098)
	22556-PF4-000	6	2.6 (0.102)
	22557-PF4-000	7	2.7 (0.106)
	22558-PF4-000	8	2.8 (0.110)
	22559-PF4-000	9	2.9 (0.114)
	22560-PF4-000	10	3.0 (0.118)
	22561-PF4-000	11	3.1 (0.122)
	22562-PF4-000	12	3.2 (0.126)
	22563-PF4-000	13	3.3 (0.130)
	22564-PF4-000	14	3.4 (0.134)
2nd only	22631-PR9-003	1	3.1 (0.122)
	22632-PR9-003	2	3.2 (0.126)
	22633-PR9-003	3	3.3 (0.130)
	22634-PR9-003	4	3.4 (0.134)
	22635-PR9-003	5	3.5 (0.138)
	22636-PR9-003	6	3.6 (0.142)
	22637-PR9-003	7	3.7 (0.146)
	22638-PR9-003	8	3.8 (0.150)
	22639-PR9-003	9	3.9 (0.154)

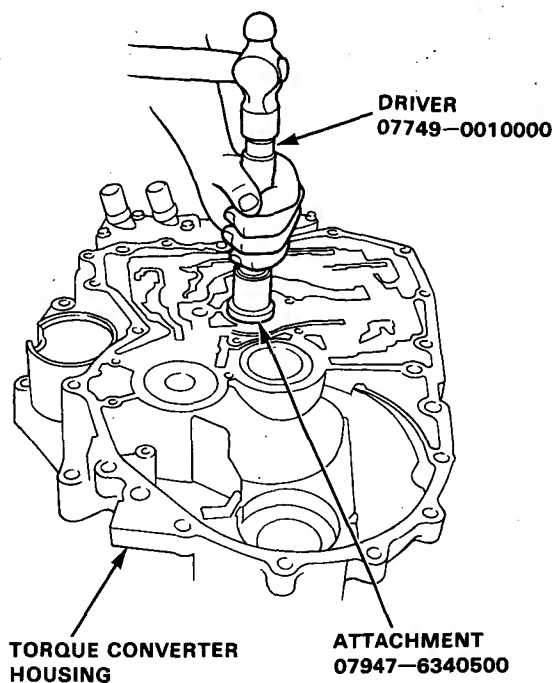




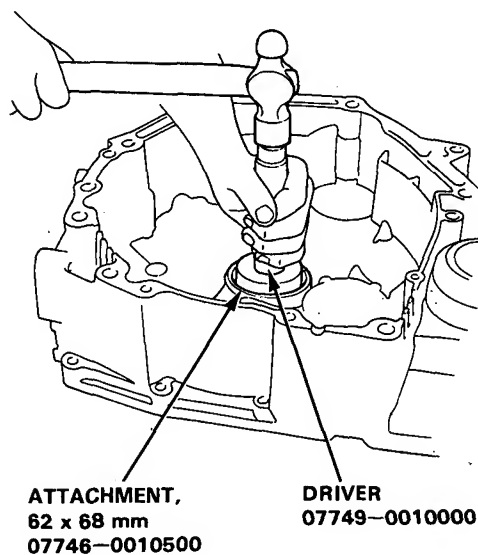
# Torque Converter Housing Bearings

## Mainshaft Bearing/Oil Seal

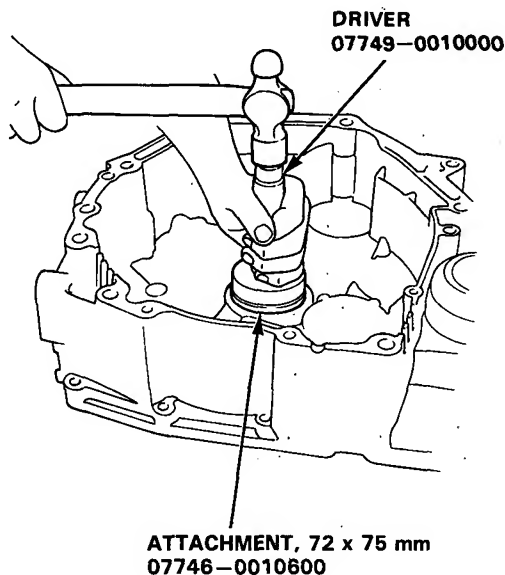
1. Drive out the mainshaft bearing and oil seal using the special tools as shown.



2. Drive in the new mainshaft bearing until it bottoms in the housing, using the special tools as shown.



3. Install the oil seal flush with the housing using the special tools as shown.

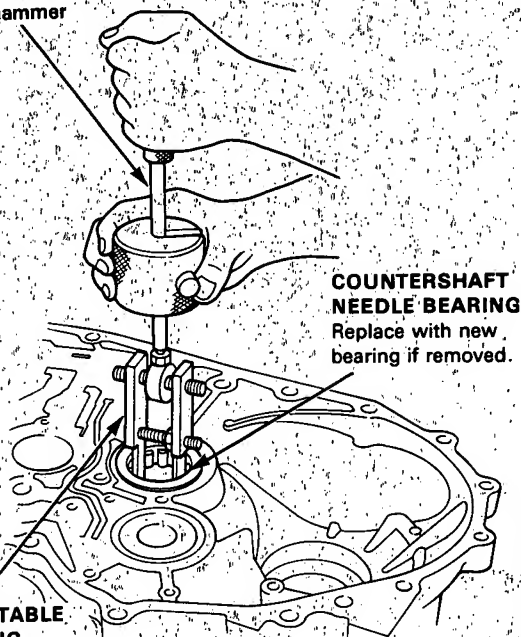


# Torque Converter Housing Bearings

## Countershaft Bearing

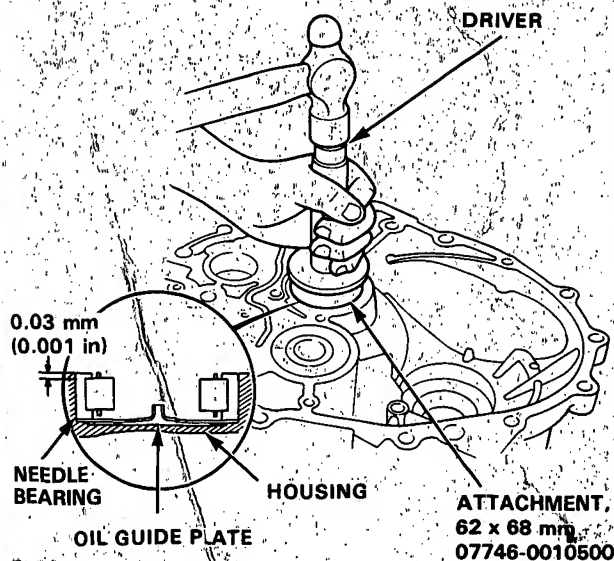
1. Remove the differential assembly.
2. Remove the countershaft needle bearing using the special tool as shown.
3. Replace the oil guide plate.

Commercially Available  
3/8 in. x 16 threads/in.  
slide hammer



**ADJUSTABLE BEARING PULLER,**  
25-40 mm  
07736-A01000A

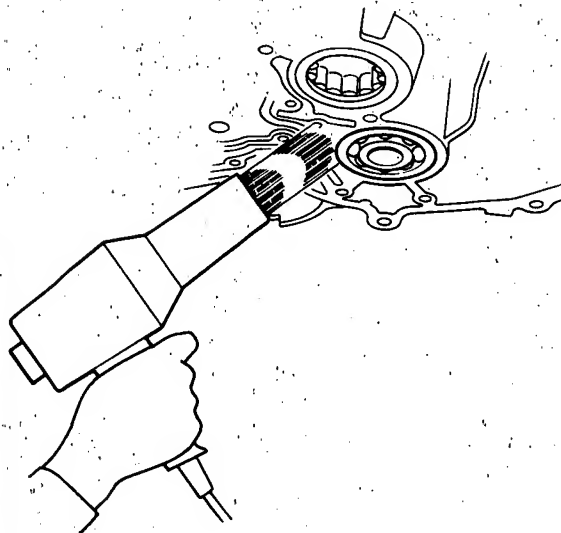
4. Drive the new needle bearing into the housing using the special tools as shown.



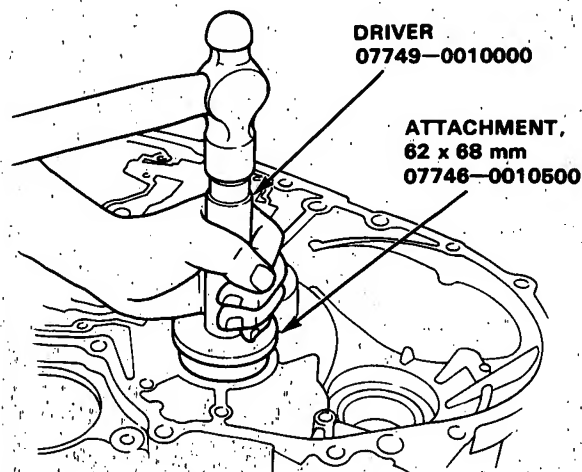
## Secondary Shaft Bearing

1. Remove the secondary shaft bearing by heating the torque converter housing to 212°F (100°C) with a heat gun, then tap the housing until the bearing falls out.

**CAUTION:** Do not heat the housing in excess of 212°F (100°C).



2. Drive the new bearing flush with the housing using the special tools as shown.





# Transmission Housing Bearings

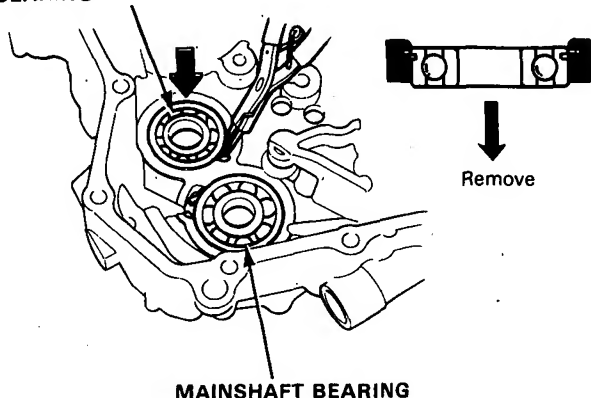


## Replacement

1. To remove the mainshaft, countershaft and secondary shaft bearings from the transmission housing, expand each snap ring with snap ring pliers, then push the bearing out.

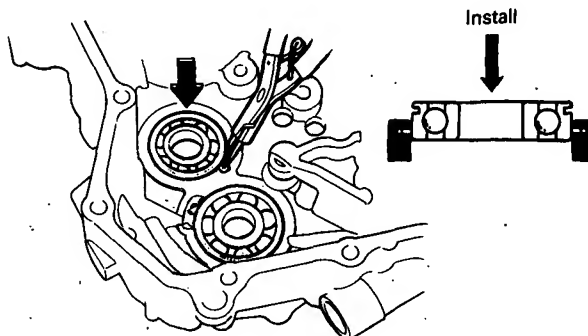
NOTE: Do not remove the snap rings unless it's necessary to clean the grooves in the housing.

COUNTERSHAFT BEARING



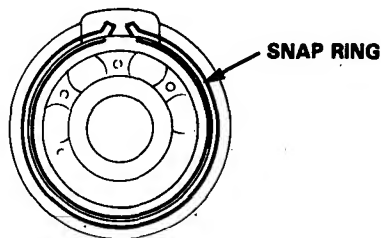
2. Expand each snap ring with snap ring pliers, insert the new bearing part-way into it, then release the pliers. Push the bearing down into the transmission until the ring snaps in place around it.

NOTE: Install with groove side of the bearing facing inside the transmission housing.



3. After installing the ball bearings, verify the following:

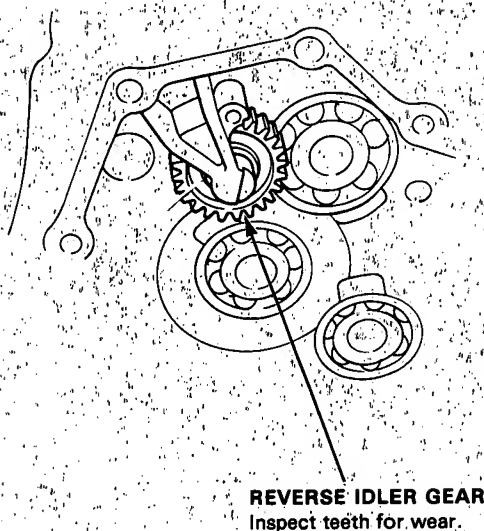
- The snap ring is seated in the bearing and housing grooves.
- The snap ring operates properly.



# Reverse Idler Gear

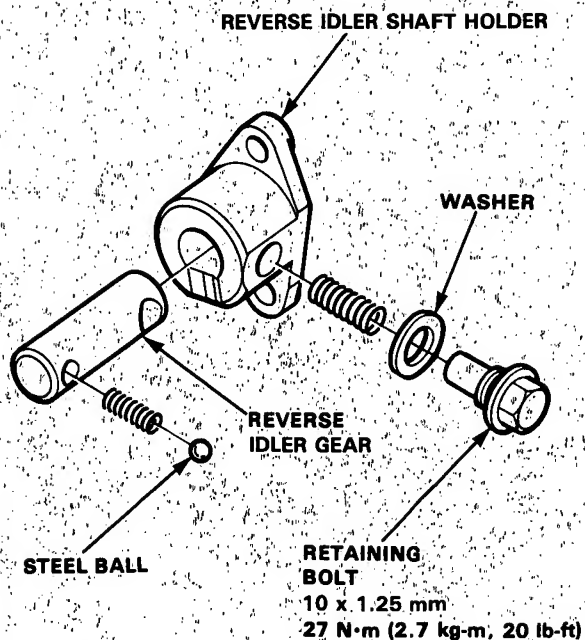
## Installation

1. Install the reverse idler gear.



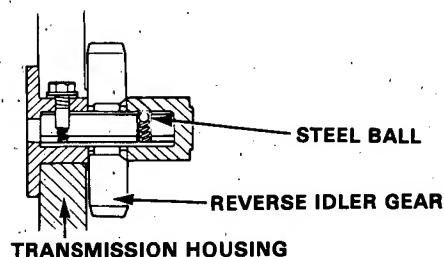
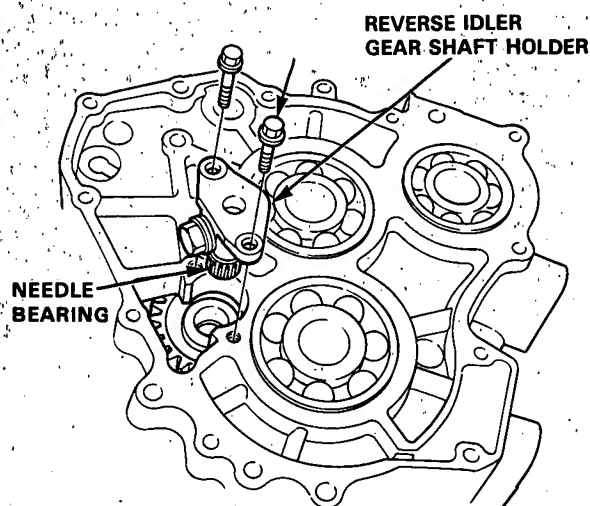
2. Assemble the reverse idler shaft holder.

**NOTE:** Align the hole in the shaft with the spring.

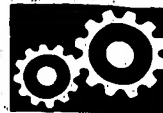


3. Install the needle bearing to the reverse idler gear shaft.
4. Install the reverse idler gear shaft holder into the transmission housing.

5. Tighten the reverse idler gear shaft holder bolts.



# Transmission



## Reassembly

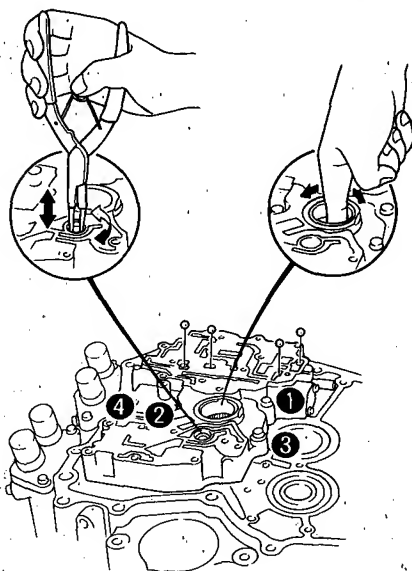
NOTE: Coat all parts with ATF.

1. Reassemble the transmission in the following numbered sequence:

### NOTE:

Make sure the pump drive gear rotates smoothly in the normal operating direction and the pump shaft moves smoothly in the axial and normal operating directions.

**CAUTION:** If the pump gear and pump shaft do not move freely, loosen the valve body bolts, realign the shaft, and then retighten to the specified torque. Failure to align the pump shaft correctly will result in a seized pump gear or pump shaft.



\* ⑥, ⑬, ⑮, ②②, ②④, ②⑥, ②⑧, ③④ Bolts

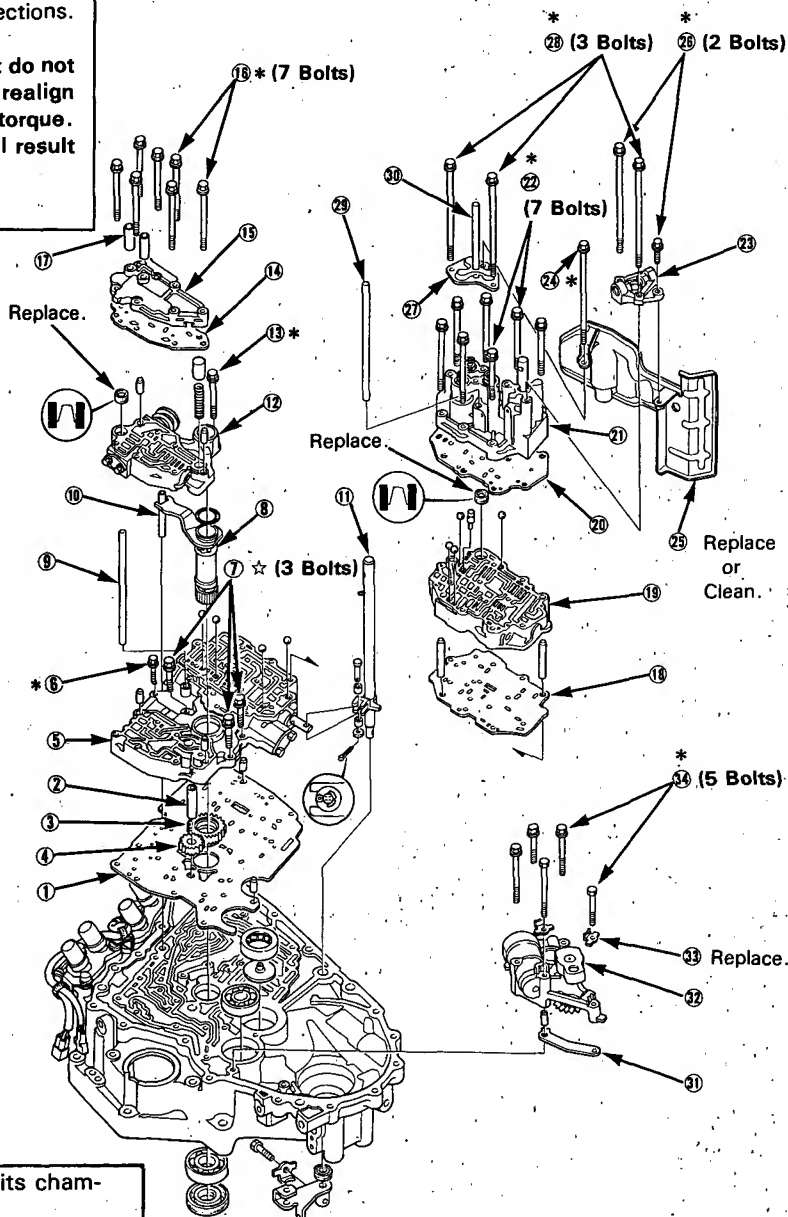
12 N·m (1.2 kg-m, 9 lb-ft)

☆ ⑦ Bolts

18 N·m (1.8 kg-m, 13 lb-ft)

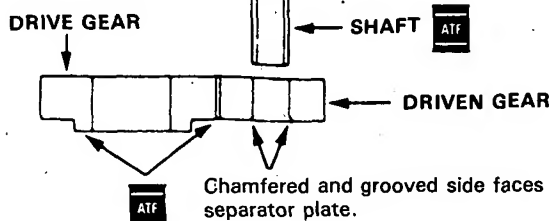
②⑧

**CAUTION:** To prevent stripping the threads, press down on the accumulator cover while installing the bolts.



②, ③, ④

NOTE: Install the oil pump driven gear with its chamfered and grooved side facing down.



(cont'd)

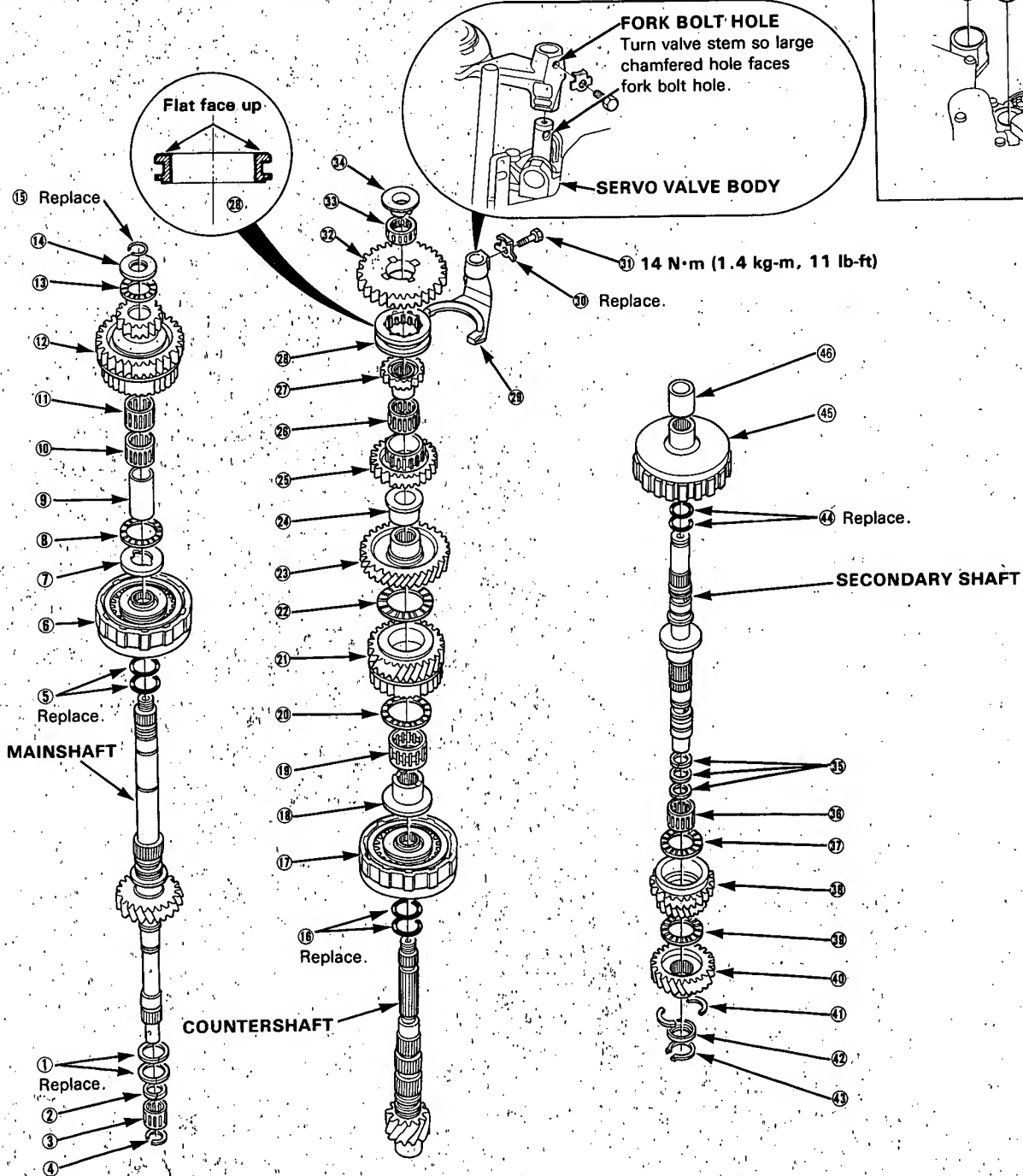
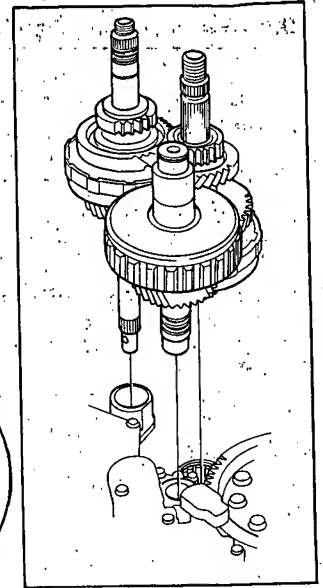
## Transmission

## Reassembly (cont'd)

2. Install parts number ① through ⑮ on the mainshaft.
3. Install parts number ⑱ through ⑳ on the countershaft.
4. Install parts number ㉓ through ㉔ on the secondary shaft.
5. Set the countershaft, mainshaft and secondary shaft in place as an assembly.

**NOTE:** Do not tap on the shafts with a hammer to drive in.

6. Install parts number 24 through 28 on the countershaft.  
NOTE: Install the reverse gear selector with its flat facing up.
7. Install the reverse shift fork over the servo valve stem. Align the hole in the stem with hole in fork as shown, and install the bolt and new lock washer. Bend the lock tab against the bolt head.
8. Install parts number 32 through 34 on the countershaft.

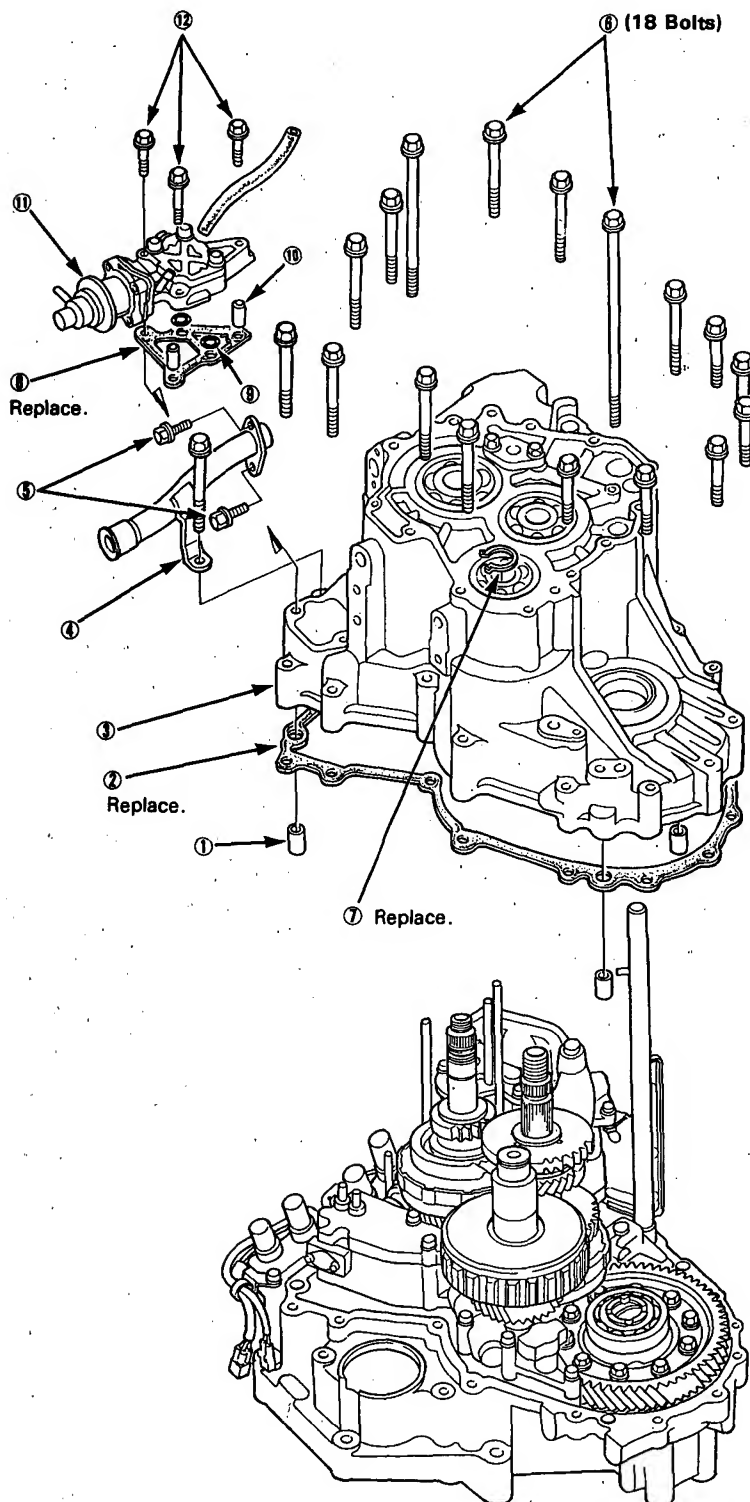




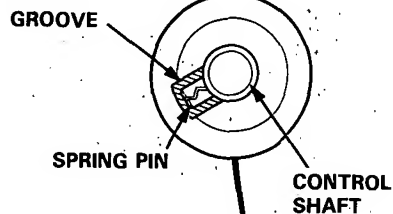
9. Assemble the transmission in the following numbered sequence.

⑤ : 27 N·m (2.7 kg-m, 20 lb-ft)

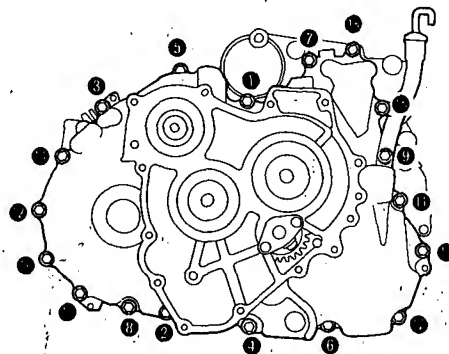
⑫ : 12 N·m (1.2 kg-m, 9 lb-ft)



③ NOTE: Align the spring pin with the transmission housing groove by turning the control shaft.



⑥ Install the bolts in the locations shown.  
55 N·m (5.5 kg-m, 40 lb-ft)



(cont'd)

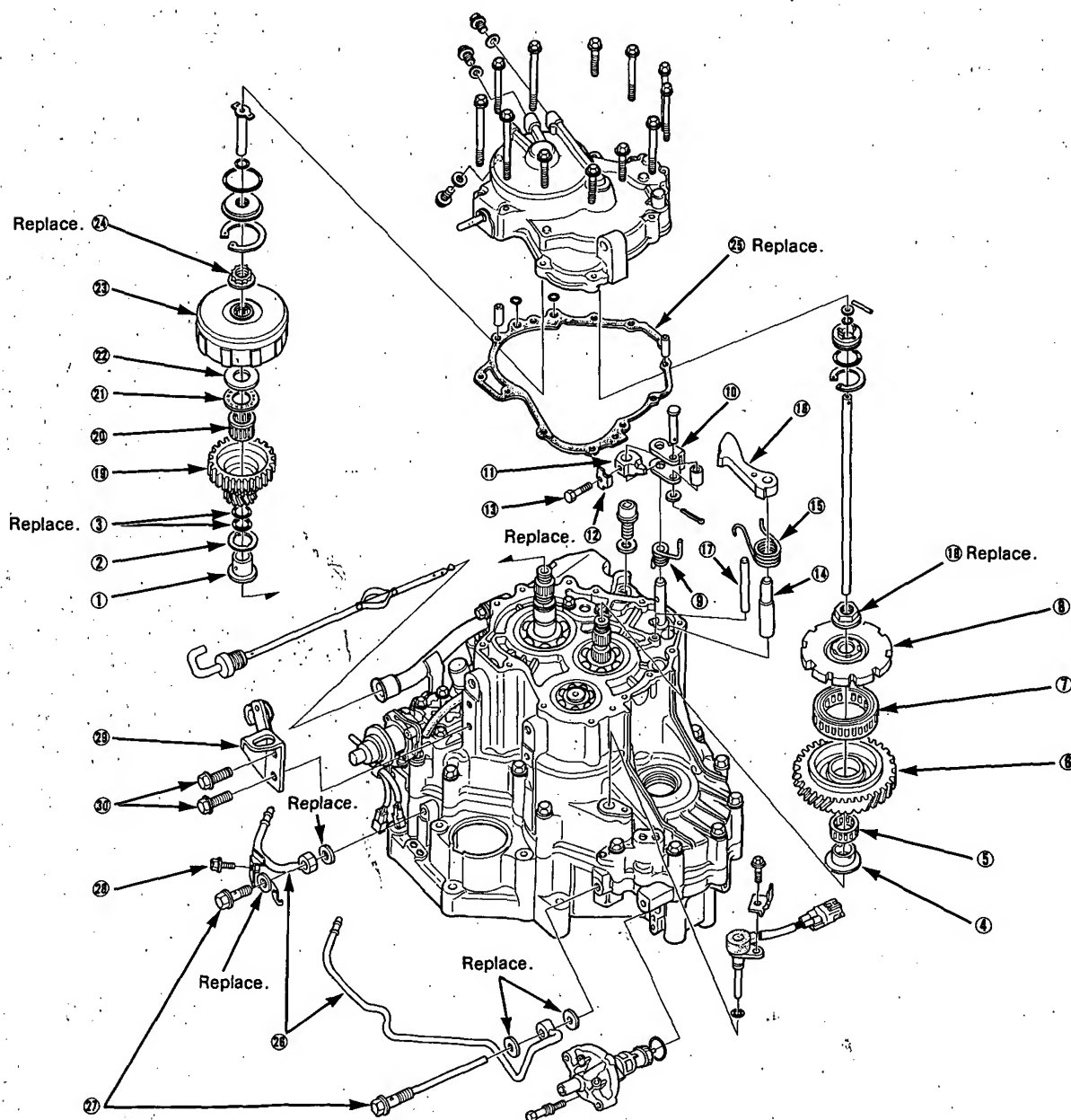
# Transmission

## Reassembly (cont'd)

10. Assemble the transmission in the following numbered sequence.

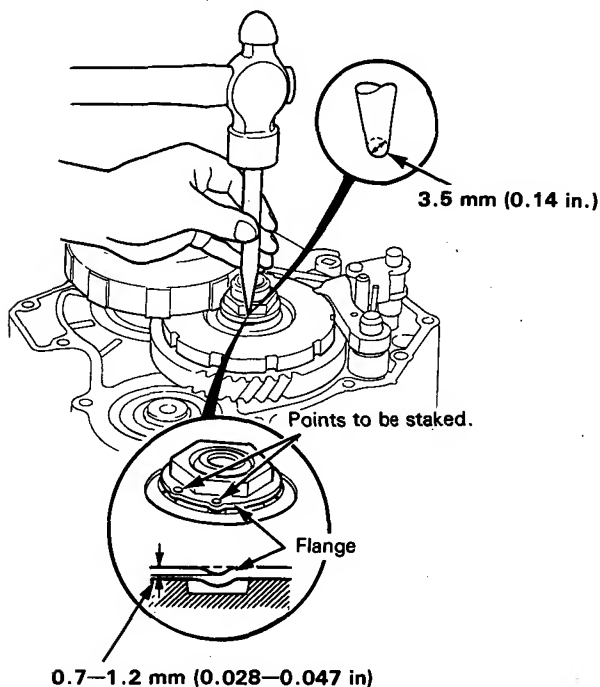
- ⑬ : 14 N·m (1.4 kg-m, 10 lb-ft)
- ⑮ : 140→0→140 N·m (14.0→0→14.0 kg-m, 102→0→102 lb-ft)
- ⑳ : 95→0→95 N·m (9.5→0→9.5 kg-m, 70→0→70 lb-ft)
- ㉑ : 29 N·m (2.9 kg-m, 21 lb-ft)
- ㉒ : 12 N·m (1.2 kg-m, 9 lb-ft)
- ㉓ : 55 N·m (5.5 kg-m, 40 lb-ft)

㉑ NOTE: Locknut has left-hand threads.

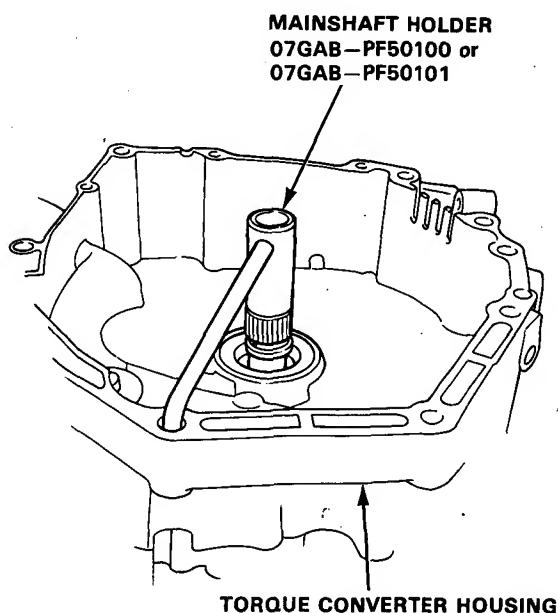




11. Shift the control shaft to **P** position.
12. Install and torque the new countershaft locknut. Tighten to specified torque, then loosen and retighten to same torque.  
Torque: 140→0→140 N·m (14.0→0→14.0 kg-m, 102→0→102 lb-ft)
13. Stake the locknut flange at two places into the gear grooves using a 3.5 mm punch.



14. Install the special tool as shown.

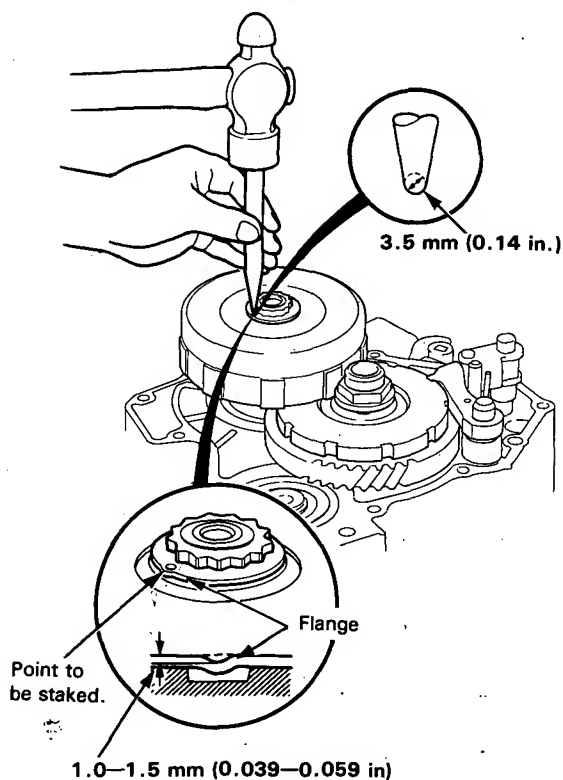


15. Install and torque the new mainshaft locknut. Tighten to specified torque, then loosen and retighten to same torque.

Torque: 95→0→95 N·m (9.5→0→9.5 kg-m, 70→0→70 lb-ft)

NOTE: Locknut has left-hand threads.

16. Stake the locknut flange into the groove in the 1st clutch.

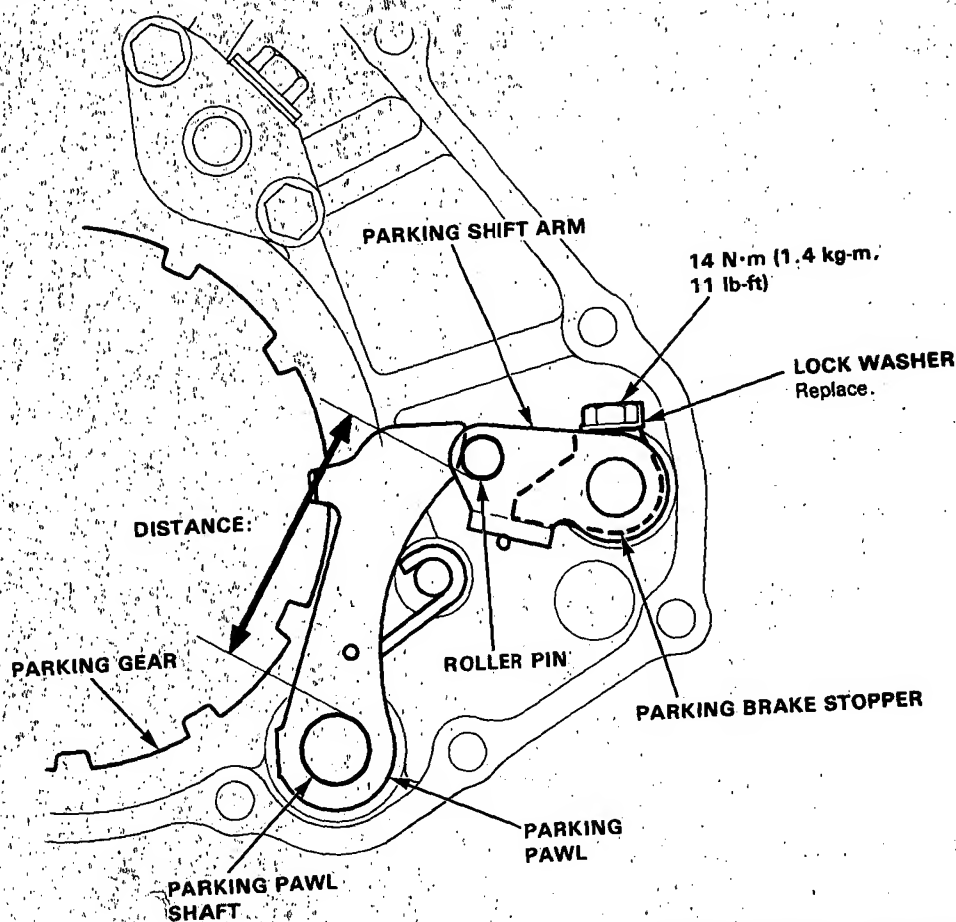


# Parking Brake Stopper

## Inspection/Adjustment

1. Set the parking shift arm in the **P** position.
2. Measure the distance between the parking pawl shaft and the parking shift arm roller pin, as shown.

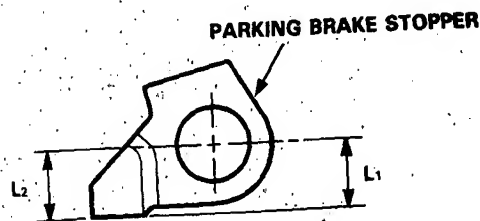
DISTANCE: 55.3–56.3 mm (2.177–2.216 in.)



3. If the measurement is out of tolerance, select and install the appropriate parking brake stopper from the table below.

**PARKING BRAKE STOPPER**

Mark	Part Number	L <sub>1</sub>	L <sub>2</sub>
1	24537-PA9-003	11.00 mm (0.433 in)	11.00 mm (0.433 in)
2	24538-PA9-003	10.80 mm (0.425 in)	10.65 mm (0.419 in)
3	24539-PA9-003	10.60 mm (0.417 in)	10.30 mm (0.406 in)



4. After replacing the parking brake stopper, make sure the distance is within tolerance.

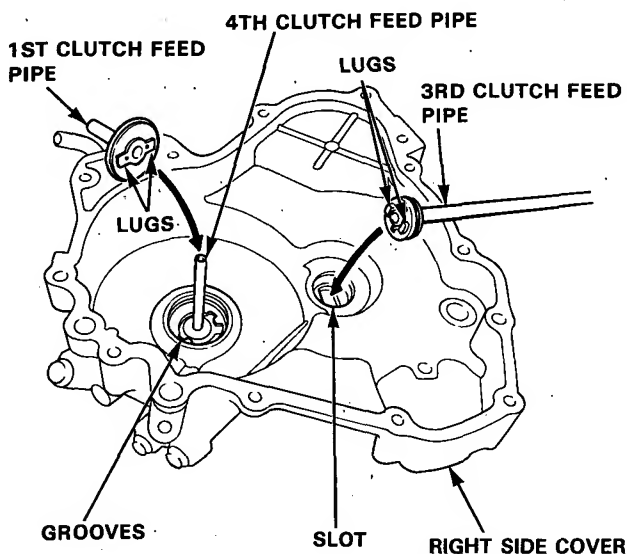


# Right Side Cover

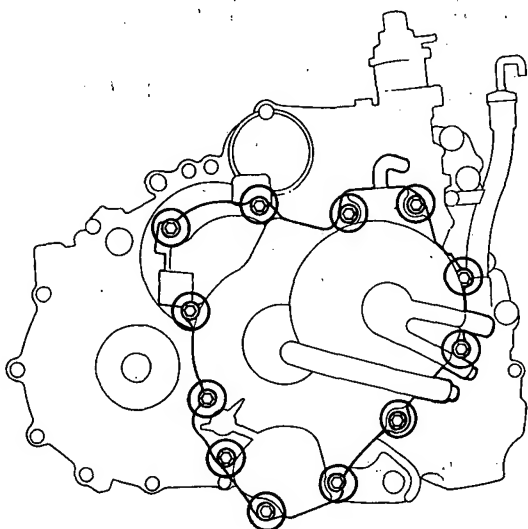


## Reassembly

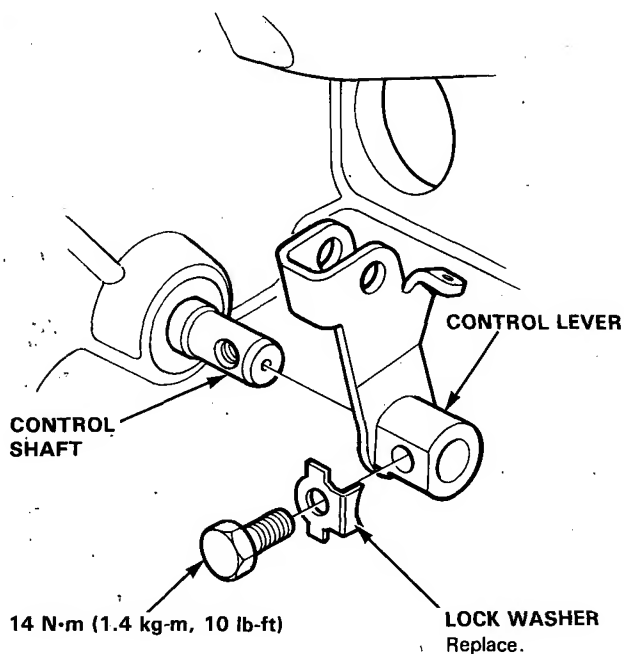
1. With the 3rd feed pipe assembled, align the lugs on the 3rd clutch feed pipe with the groove in the right side cover.
2. Install the snap ring.
3. Install 1st clutch feed pipe in the right side cover, aligning the lugs of the 1st clutch feed pipe with the grooves of the right side cover.
4. Install the snap ring.



5. Install the right side cover.  
Torque: 12 N·m (1.2 kg-m, 9 lb-ft)



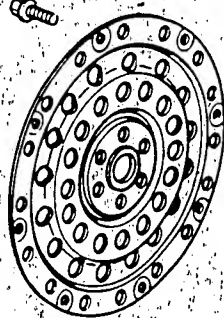
6. Install the control lever and new lock washer on the other end of shaft. Tighten the bolt to the torque shown, then bend the tab over against the bolt head.



# Torque Converter

## Disassembly

6 x 1.0 mm  
12 N·m (1.2 kg-m, 9 lb-ft)

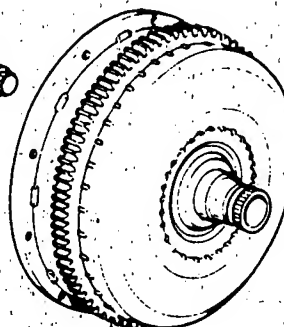


DRIVE PLATE  
Inspect for cracks.

Torque in crisscross pattern.  
12 x 1.0 mm  
75 N·m (7.5 kg-m, 54 lb-ft)



WASHER



RING GEAR AND TORQUE  
CONVERTER ASSEMBLY



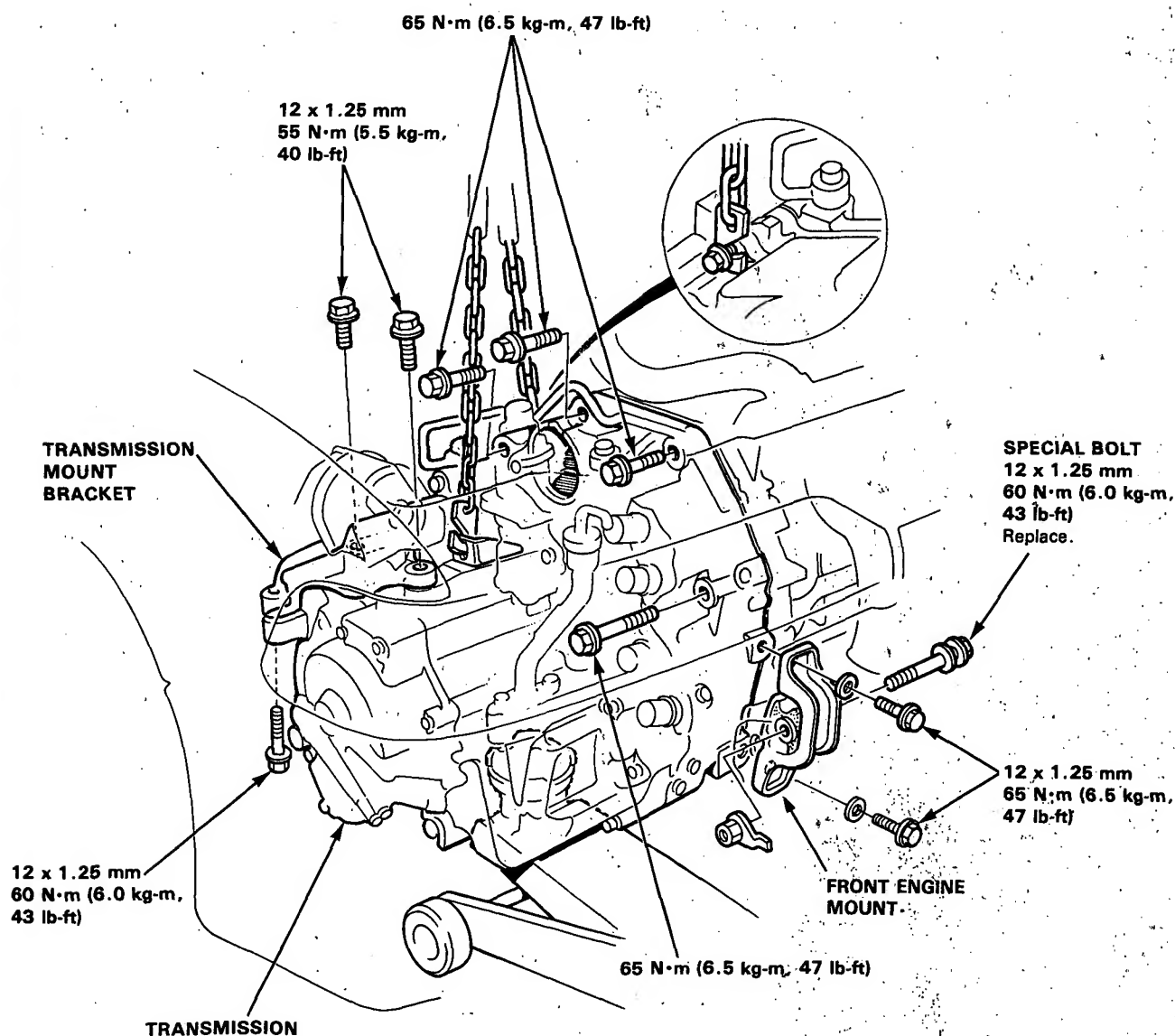
O-RING  
Replace.

# Transmission

## Installation



1. Place the transmission on the transmission jack, and raise to the engine level.
2. Check that the two 14 mm dowel pins are installed in the torque converter housing.
3. Install the four transmission housing mounting bolts, then install the transmission to the engine block.
4. Install the front engine mount to the front beam.
5. Install the transmission to the front engine mount.
6. Install the transmission to transmission mount bracket.
7. Remove the transmission jack.



(cont'd)

# Transmission

## Installation (cont'd)

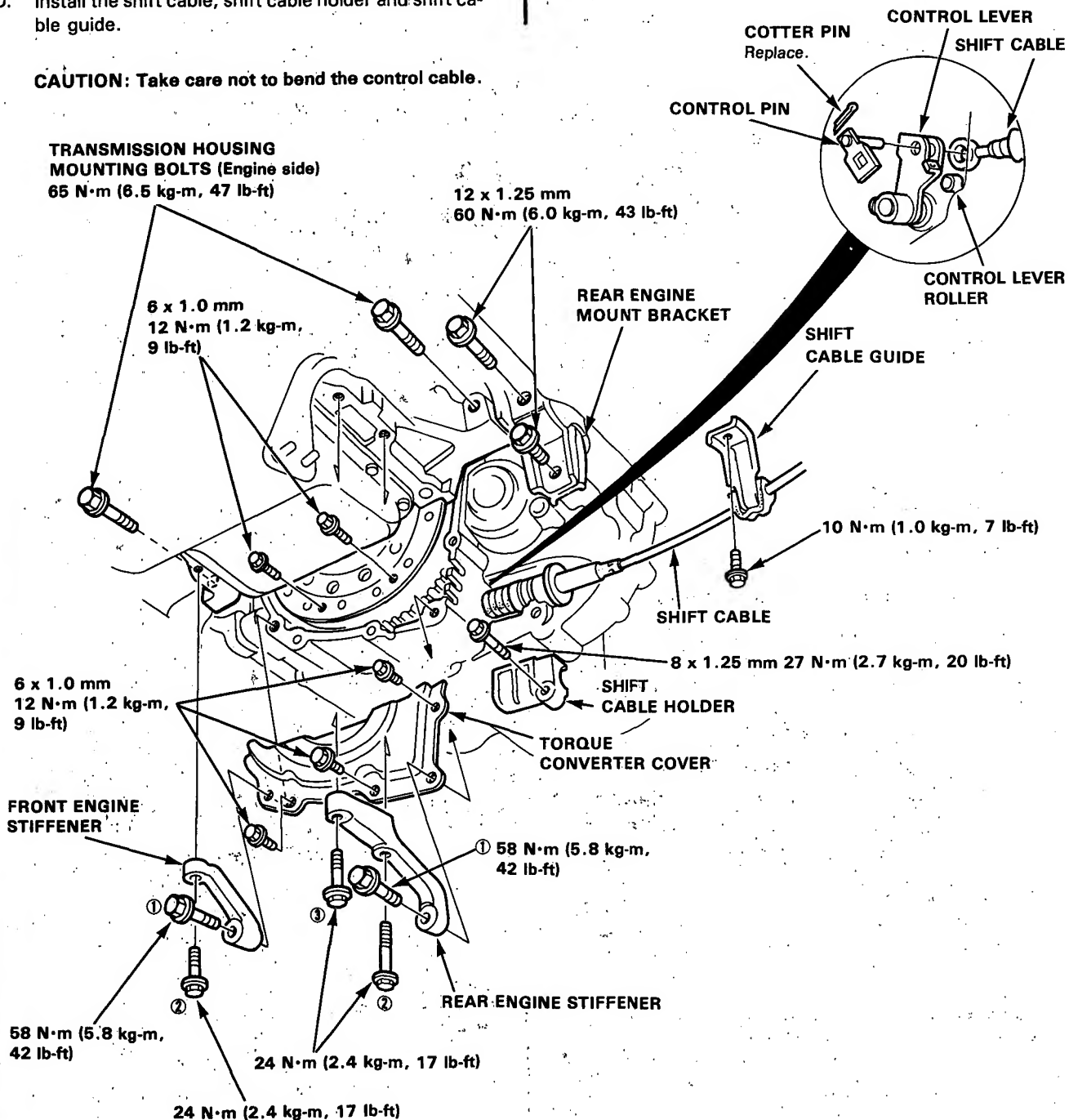
8. Install the two transmission housing mounting bolts (engine side) and rear engine mount bracket bolts.
9. Attach the torque converter to the drive plate with eight bolts, and torque to 12 N·m (1.2 kg-m, 9 lb-ft). Rotate the crankshaft as necessary to tighten bolts to 1/2 torque, then final torque, in a criss-cross pattern. After tightening the last bolt, check that the crankshaft rotates freely.
10. Install the shift cable, shift cable holder and shift cable guide.

11. Install the torque converter cover and engine stiffeners.

NOTE: Loosely install the engine stiffener mounting bolts, then torque in the sequence shown.

12. Remove the chain hoist by removing the hanger plates.

**CAUTION:** Take care not to bend the control cable.



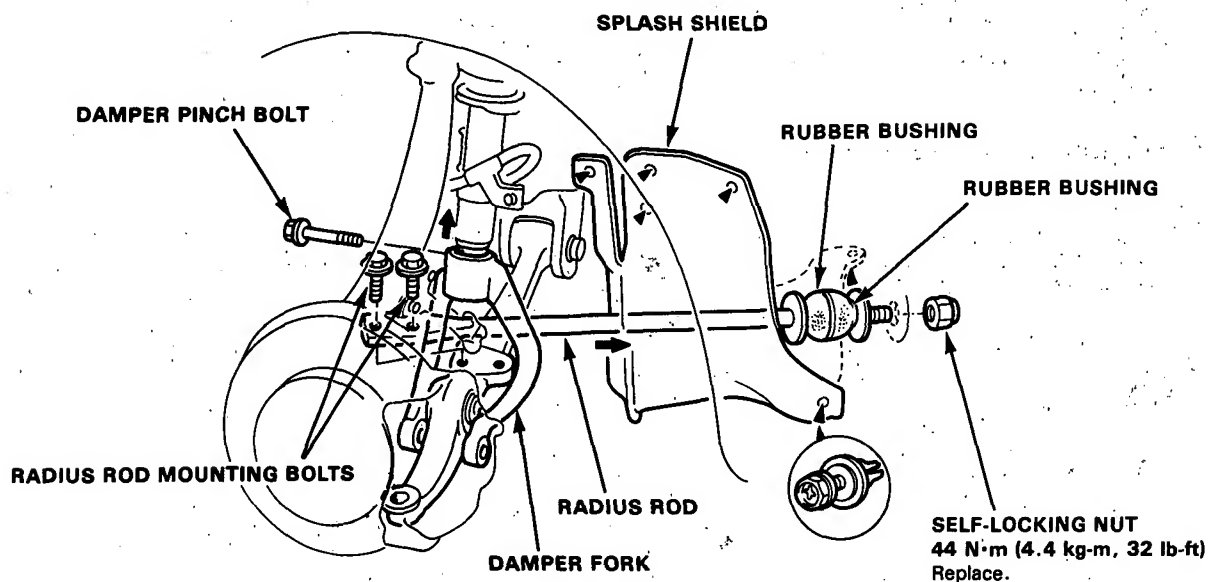


13. Install the radius rod.

NOTE: Check for deterioration or damage of the radius rod rubber bushings.

14. Install the damper fork.

15. Install the splash shield.

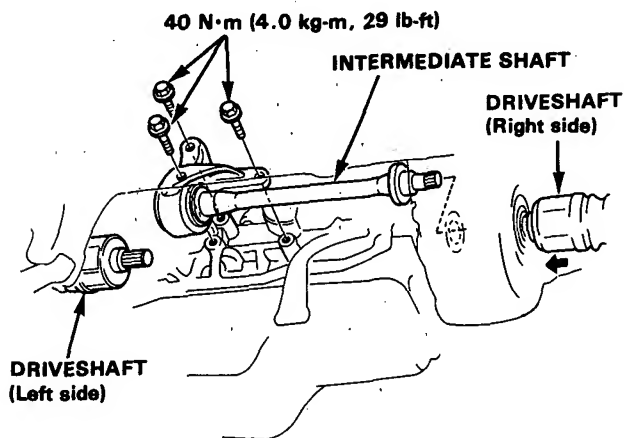


16. Install the intermediate shaft.

17. Install a new set ring on the end of each driveshaft.

18. Install the right and left driveshafts. (see section 16.)

NOTE: Turn the right and left steering knuckle fully outward, and slide the axle into the differential until you feel its spring clip engage the side gear.



19. Install the damper fork bolts and castle nuts to the lower arms.

SELF-LOCKING NUT  
65 N·m (6.5 kg-m, 47 lb-ft)  
Replace.

CASTLE NUT  
55 N·m (5.5 kg-m, 40 lb-ft)

COTTER PIN  
Replace.

DAMPER FORK BOLT

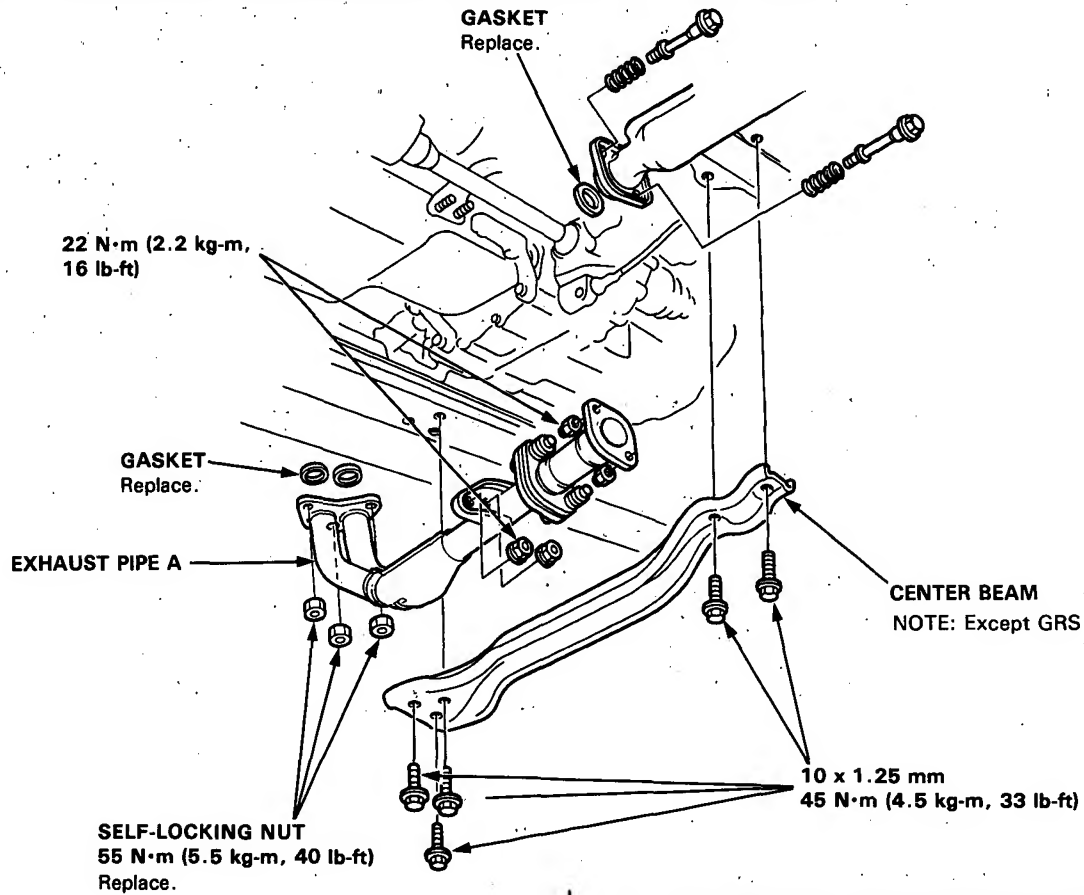
(cont'd)

# Transmission

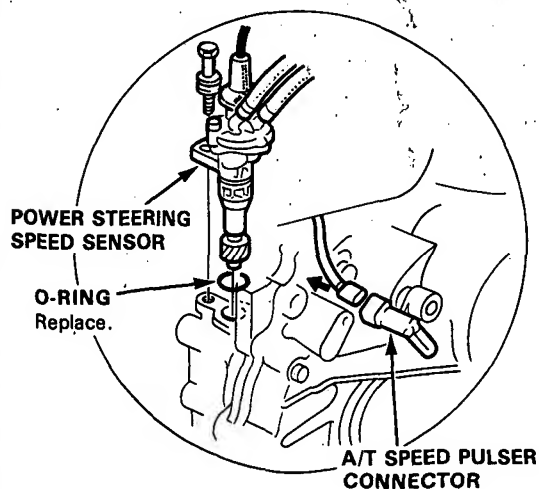
## Installation (cont'd)

20. Install the exhaust pipe A and center beam.

NOTE: The GSR (B17A1 engine) model is not equipped with the center beam.

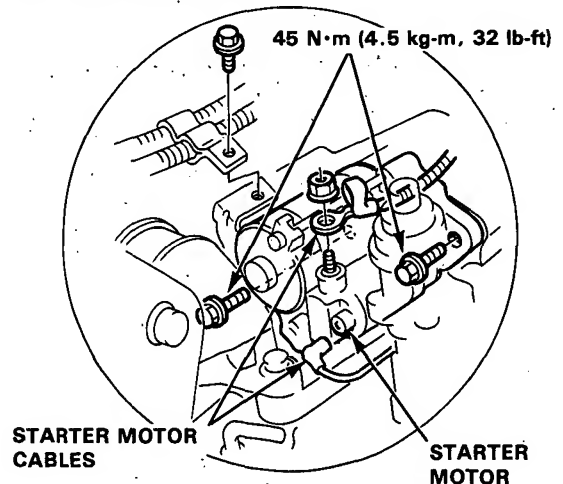


21. Install the power steering speed sensor and connect the A/T speed pulser connector.



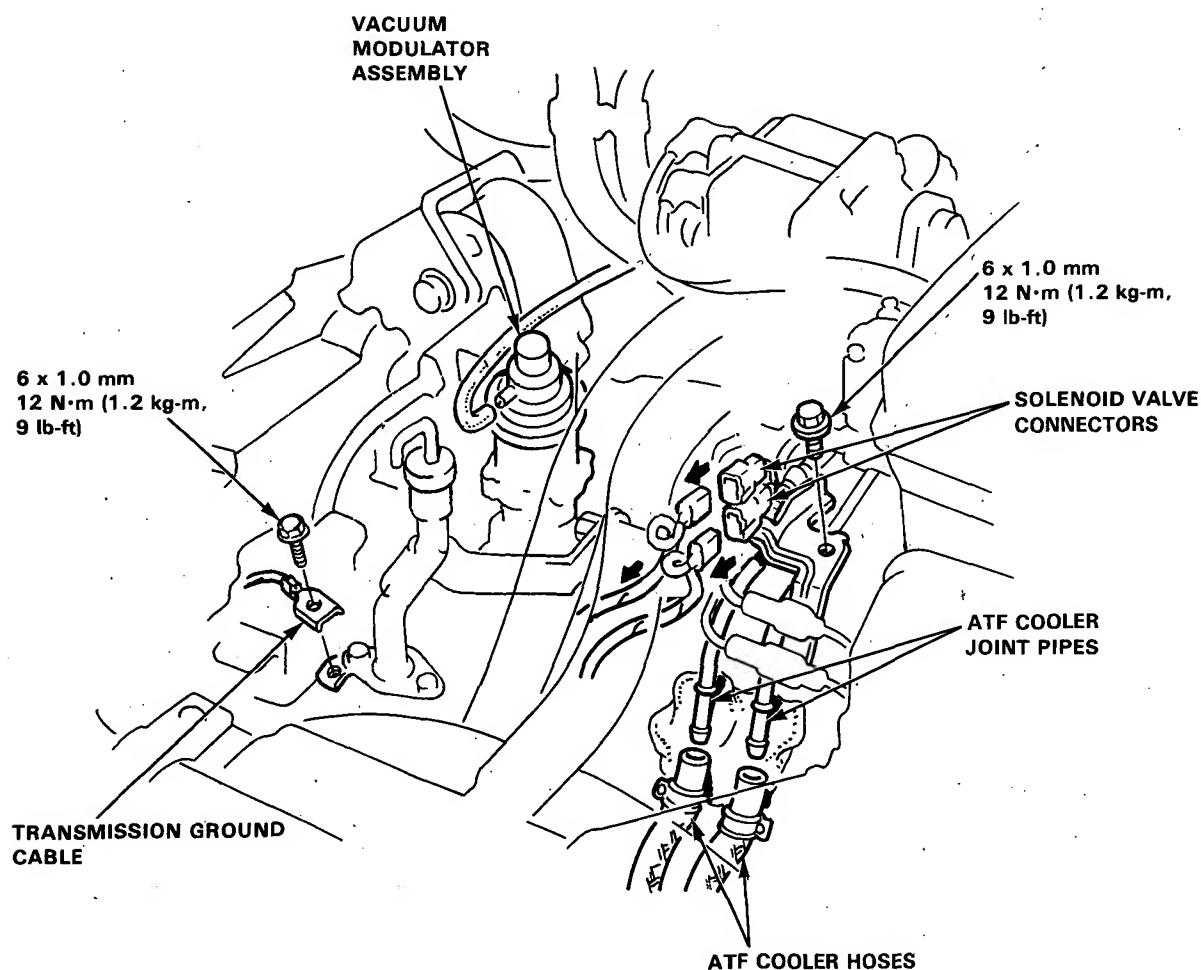
22. Install the starter motor and connect the starter motor cables.

NOTE: When installing the starter cable, make sure that the crimped side of the ring terminal is facing out (see section 23).





23. Connect the lock-up and shift control solenoid valve wire connectors.
24. Flush the ATF cooler as described on pages 14-136 and 137.
25. Connect the ATF cooler hoses to the joint pipes.
26. Connect the vacuum hose to the vacuum modulator assembly.
27. Install the transmission ground cable.
28. Install the three bolts located at the side of the battery base, and retighten the intake air duct band of the throttle body.
29. Refill the transmission with ATF.
30. Connect the battery positive (+) and negative (-) cables to the battery.
31. Install the intake air duct.
32. Start the engine, set the parking brake, and shift the transmission through all gears three times. Check for proper shift cable adjustment.
33. Let the engine reach operating temperature (the cooling fan comes on) with the transmission in **N** or **P** position, then turn it off and check the fluid level.
34. Check and adjust the front wheel alignment (see section 18).
35. Road test as described on page 14-64.
36. Reset the radio stations.



# Transmission Cooler Flushing

**⚠ WARNING** To prevent injury to face and eyes, always wear glasses or a face shield when using the transmission flusher.

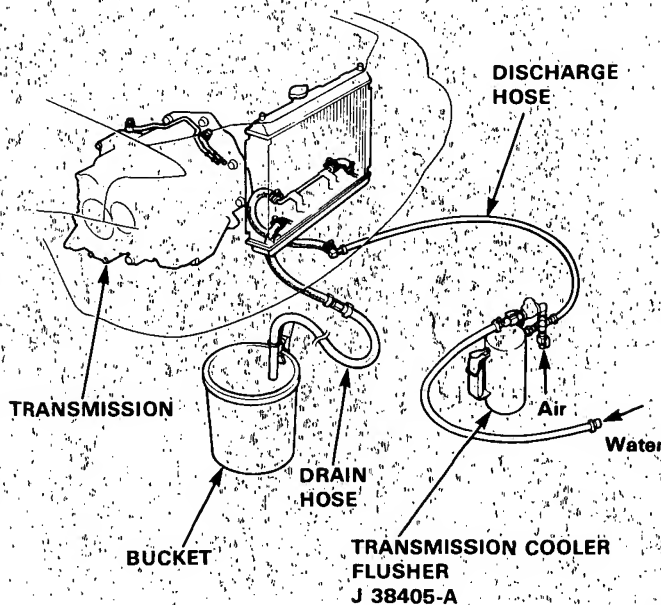
This procedure should be performed before reinstalling the transmission.

1. Check tool and hoses for wear or cracks before using. If wear or cracks are found, replace the hoses before using.
2. Using the measuring cup, fill the tank with 21 ounces (approximately 2/3 full) of biodegradable flushing fluid (J35944-20). Do not substitute with any other fluid. Follow the handling procedure on the fluid container.
3. Secure the flusher filler cap and pressurize the tank with compress air to between 80–120 psi.

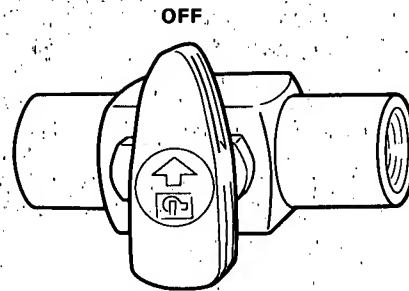
**NOTE:** The air line should be equipped with a water trap to ensure a dry air system.

4. Hang the tool under the vehicle.
5. Attach the discharge hose of the tank to the return line of the transmission cooler using a clamp.
6. Connect the drain hose to the inlet line of the transmission cooler using a clamp.

**IMPORTANT:** Securely clamp the opposite end of the drain hose to a bucket or floor drain.



7. With the water and air valves off, attach the water and air supplies to the flusher. (Hot water if available.)



8. Turn on the flusher water valve so water will flow through the oil cooler for 10 seconds.

**NOTE:** If water does not flow through the oil cooler it is completely plugged, cannot be flushed, and must be replaced.

9. Depress the trigger to mix flushing fluid into the water flow. Use the wire clip to hold the trigger down.
  10. While flushing with the water and flushing fluid for 2 minutes, turn the air valve on for 5 seconds evenly 15-20 seconds to create a surging action. (AIR PRESSURE MAX. 120 PSI)
  11. Turn the water valve off. Replace the trigger, then reverse the hoses to the cooler so you can flush in the opposite direction. Repeat steps 8 through 10.
  12. Release the trigger and allow water only to rinse the cooler with water for one minute.
  13. Turn the water valve off and turn off the water supply.
  14. Turn the air valve on to dry the system out with air for two full minutes or until no moisture is visible leaving the drain hose.
- CAUTION:** Residual moisture in the oil cooler or pipes can damage the transmission.
15. Remove the flusher from the cooler line. Attach the drain hose to a oil container.
  16. Install the transmission and leave the drain hose attached to the cooler line.

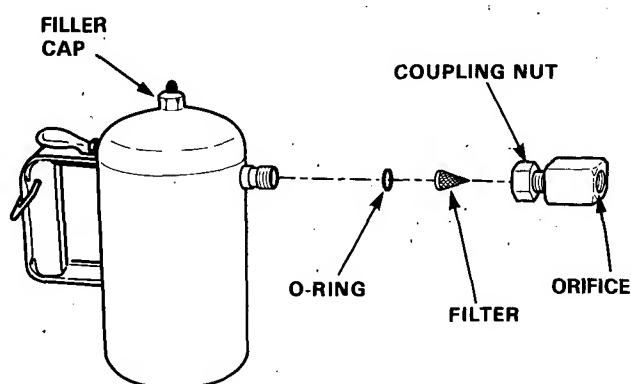




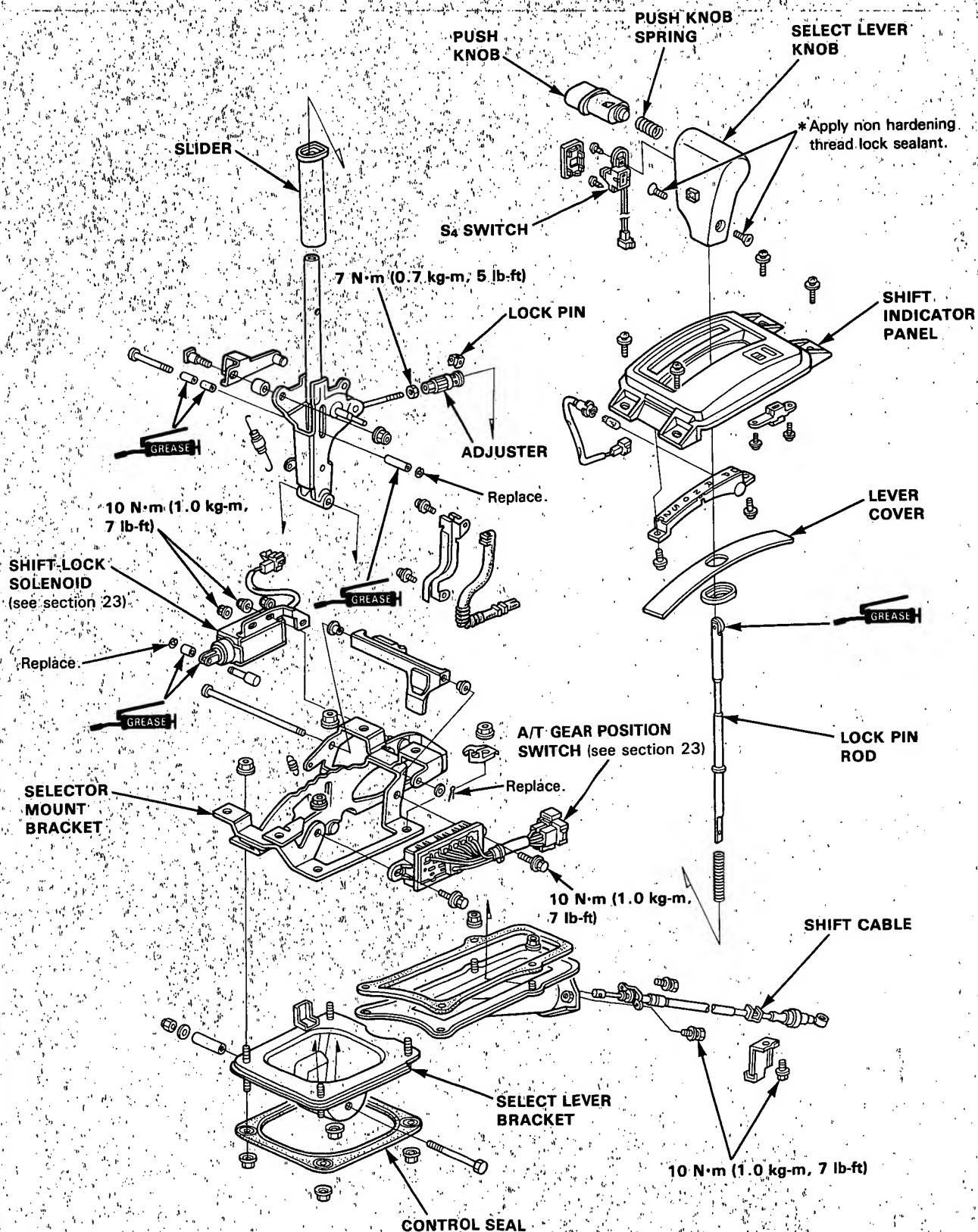
17. Make sure the transmission is in **P** position. Then fill the transmission with ATF and run the engine for 30 seconds or until approximately one quart is discharged.
18. Remove the drain hose and reconnect the cooler return hose to the transmission.
19. Refill the transmission with ATF to proper level.

#### TOOL MAINTENANCE

1. Empty and rinse after each use. Fill the can with water and pressurize the can. Flush the discharge line to ensure that unit is clean.
2. If discharge liquid does not foam, the orifice may be blocked.
3. To clean, remove the large coupling nut.
4. Remove the in-line filter from the discharge side and clean if necessary.
5. The fluid orifice is located behind the filter. Clean it with the pick stored in the bottom of the tank handle or blow it clean with air. Securely reassemble all parts.



# Gearshift Selector

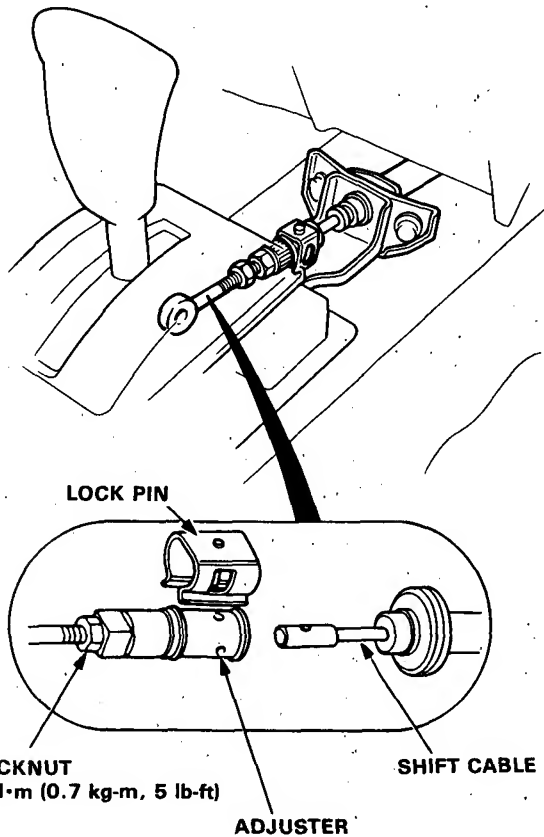


# Shift Cable

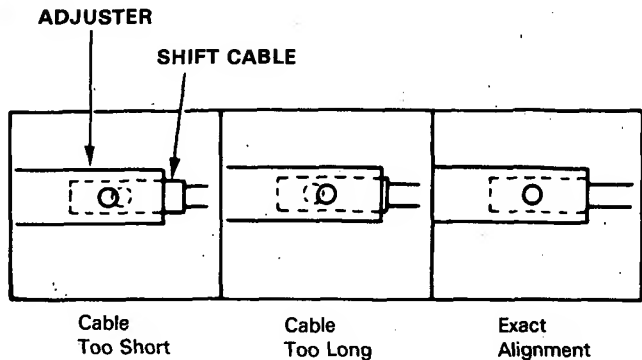
## Adjustment



1. Start the engine. Shift to reverse to see if the reverse gear engages. If not, refer to troubleshooting on page 14-60 thru 14-63.
2. With the engine off, remove the front console (see section 20).
3. Shift to **N** position, then remove the lock pin from the cable adjuster.



4. Check that the hole in the adjuster is perfectly aligned with the hole in the shift cable.



**NOTE:** There are two holes in the end of the shift cable. They are positioned 90° apart to allow cable adjustments in 1/4 turn increments.

5. If not perfectly aligned, loosen the locknut on the shift cable and adjust as required.
6. Tighten the locknut.
7. Install the lock pin on the adjuster.

**NOTE:** If you feel the lock pin binding as you reinstall it, the cable is still out of adjustment and must be readjusted.

8. Start the engine and check the shift lever in all gears. If any gear does not work properly, refer to troubleshooting on page 14-60 thru 14-63.

# Shift Cable

## Removal/Installation

### ⚠ WARNING

- Make sure jacks and safety stands are placed properly and hoist brackets are attached to correct positions on the engine (see section 1).
- Apply parking brake and block rear wheels, so car will not roll off stands and fall on you while working under it.

1. Remove the front console (see section 20).
2. Remove the lock pin from the cable adjuster.
3. Remove the bolts, then remove the cable bracket and shift cable guide.
4. Remove the center beam and exhaust pipe A (see page 14-75).

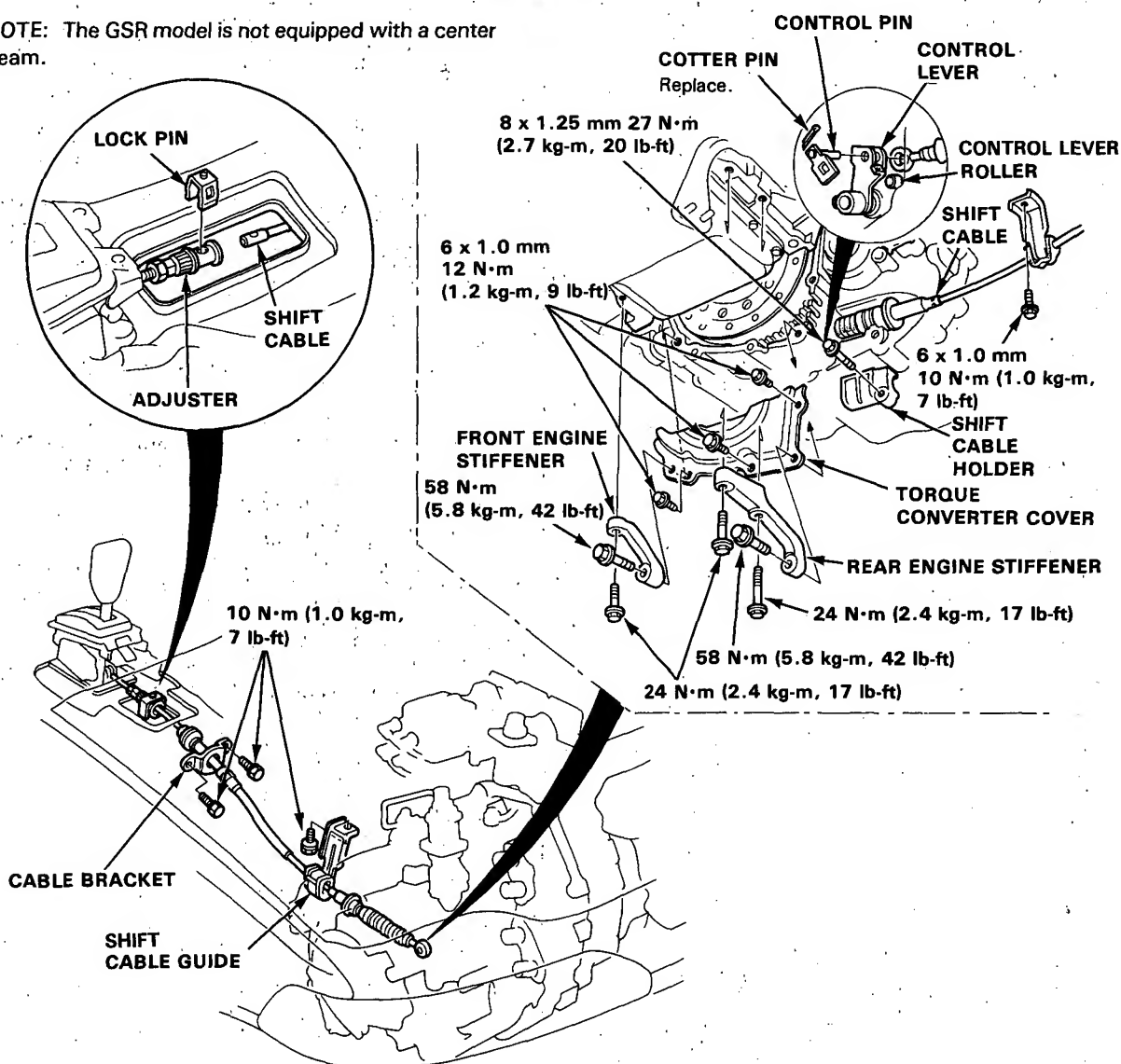
NOTE: The GSR model is not equipped with a center beam.

5. Remove the front and rear engine stiffeners.
6. Remove the torque converter cover and shift cable holder.
7. Remove the shift cable by removing the cotter pin, control pin and control lever roller from the control lever.

**CAUTION:** Take care not to bend the cable when removing/installing it.

8. Install the shift cable in the reverse order of removal.

NOTE: On reassembly, check the cable adjustment (see page 14-139).



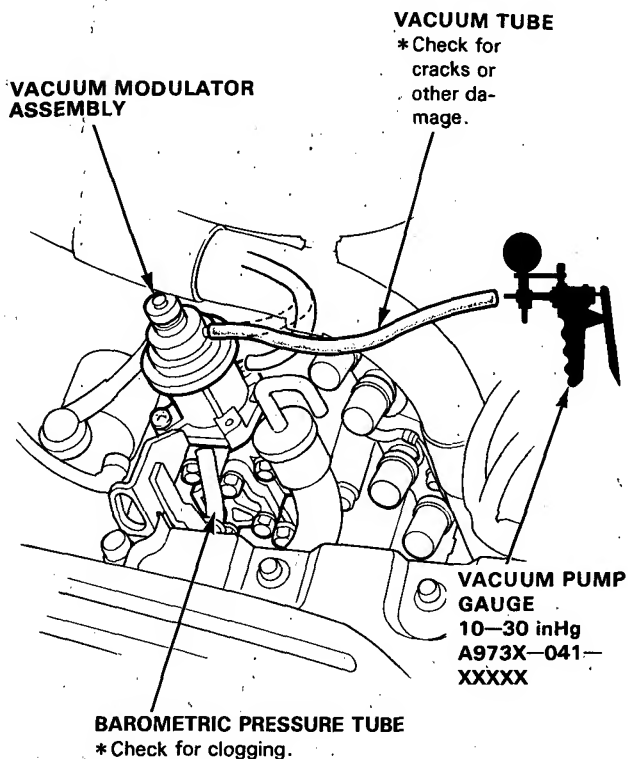
# Vacuum Modulator Assembly



## Inspection/Replacement

NOTE: For troubleshooting, refer to page 14-60. If the vacuum modulator is faulty or the throttle B pressure is out of specs, perform the following inspections.

1. Stop the engine.
2. Connect a vacuum pump to the intake manifold tube of the vacuum modulator valve, and apply a vacuum of 500–600 mmHg. (19.7–23.6 inHg)

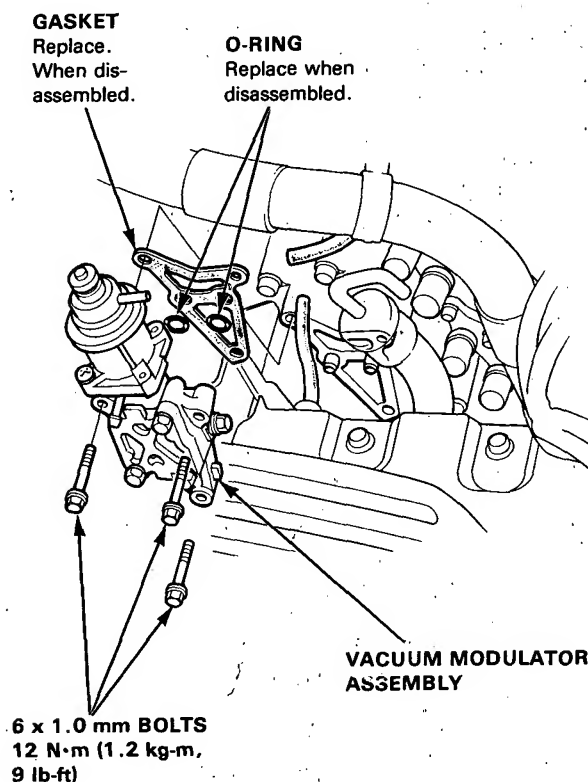


NOTE:

- Be sure that the barometric pressure tube is not clogged.
- Before checking, be sure that the vacuum tube is not damaged, and in good condition.

3. If the vacuum is not maintained, replace the modulator valve as an assembly.
4. If the vacuum is maintained, remove the vacuum modulator assembly by removing the three 6 x 1.0 1.0 mm bolts.

NOTE: Do not loosen or remove the three bolts fastening the vacuum body cover.



(cont'd)

# Vacuum Modulator Assembly

## Inspection/Replacement (cont'd)

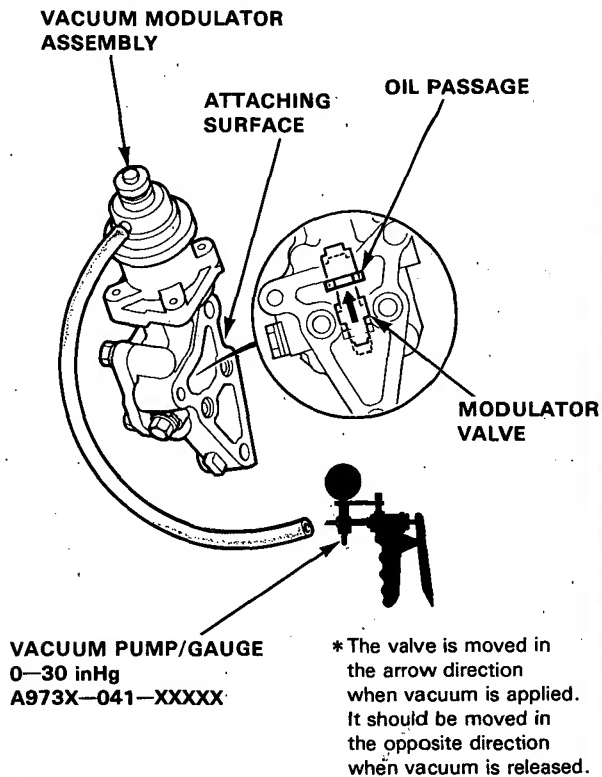
5. Apply a vacuum of 500—600 mmHg (19.7—23.6 inHg) to the intake manifold vacuum tube again to check that the modulator valve is moved.

Also check that the modulator valve moves in the opposite direction by releasing the vacuum.

Repeat the above step 2—3 times.

NOTE: You can see the movements of the valve through the oil passage in the attaching surface of the modulator valve assembly.

6. If the valve binds, or is moved but sluggishly, replace the vacuum modulator as an assembly.



## **Differential**

Manual Transmission .....	15—1
Automatic Transmission .....	15—9







## **Differential (Manual Transmission)**

**Special Tools ..... 15-2**

### **Differential**

**Illustrated Index ..... 15-3**

**Backlash Inspection ..... 15-4**

**Ball Bearing Replacement ..... 15-4**

**Ring Gear Replacement ..... 15-5**

**Oil Seal Removal ..... 15-5**

**Thrust Shim Adjustment ..... 15-6**

**Oil Seal Installation ..... 15-7**

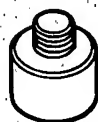


# Special Tools

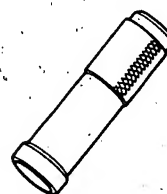
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAD-PG40100	Oil Seal Driver	1	15-7
②	07JAD-PH80400	Pilot, 28 x 30 mm	1	15-7
③	07746-0030100	Driver, 40 mm I.D.	1	15-4, 6
④	07749-0010000	Driver	1	15-7
⑤	07947-SD90200	Driver Attachment	1	15-7



①



②



③



④



⑤

# Differential

## Illustrated Index

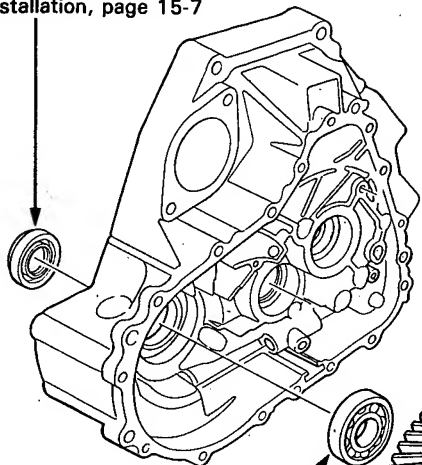


### OIL SEAL

Replace.

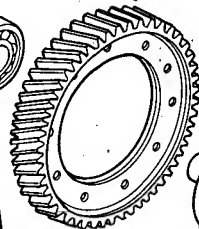
Removal, page 15-5

Installation, page 15-7



### FINAL DRIVEN GEAR

Replacement, page 15-5



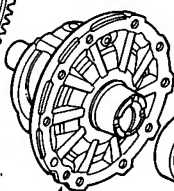
### BALL BEARING

Replacement,  
page 15-4

103 N·m (10.3 kg-m, 74 lb-ft)  
Left-hand thread



### DIFFERENTIAL CARRIER



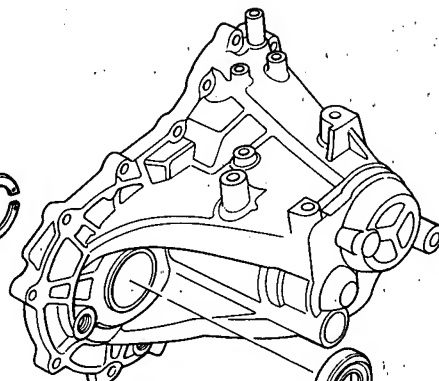
### BALL BEARING

Replacement, page 15-4



### THRUST SHIM

Selection, page 15-6



### OIL SEAL

Replace.

Removal, page 15-5

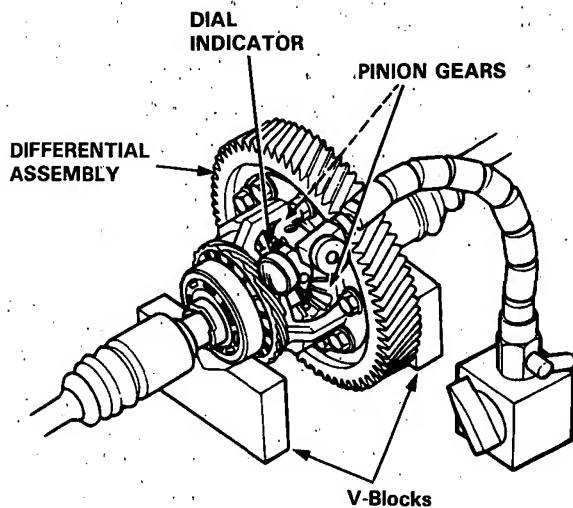
Installation, page 15-7

# Differential

## Backlash Inspection

1. Place differential assembly on V-blocks and install both axles.
2. Check backlash of both pinion gears.

Standard (New): 0.05—0.15 mm (0.002—0.006 in)

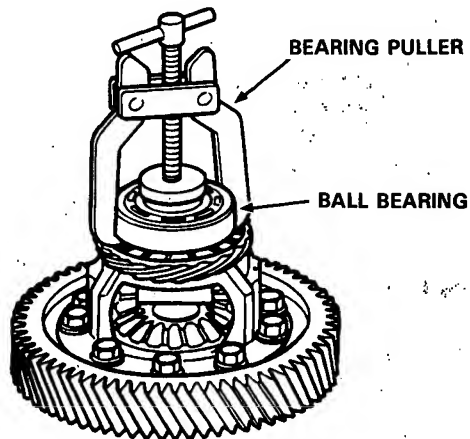


3. If the backlash is not within the standard, replace the differential carrier.

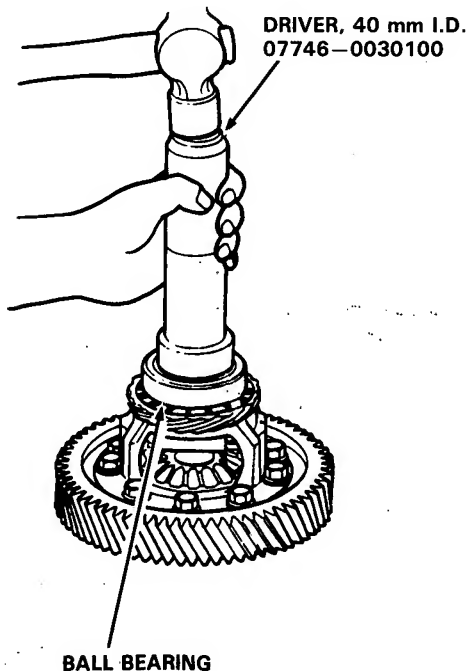
## Ball Bearing Replacement

NOTE: Check the ball bearings for wear and rough rotation. If the ball bearings are OK, removal is not necessary.

1. Remove the ball bearings using a bearing puller.



2. Install new ball bearings with the shielded side facing out using the special tool as shown.

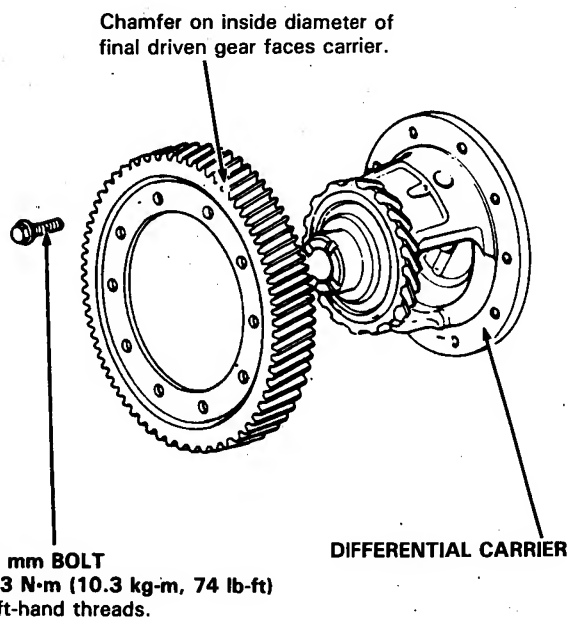




## Final Driven Gear Replacement

1. Remove the bolts in a criss-cross pattern in several steps, and remove the final driven gear from the differential carrier.

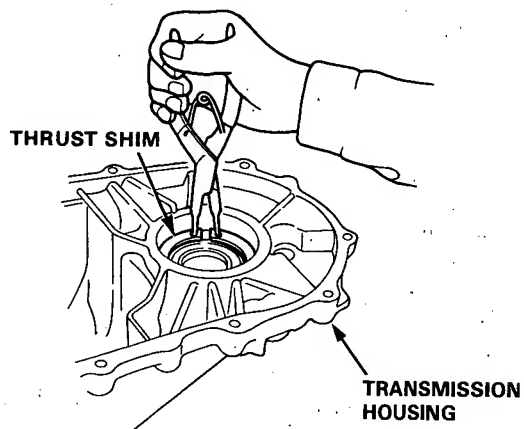
NOTE: The final driven gear bolts have left-hand threads.



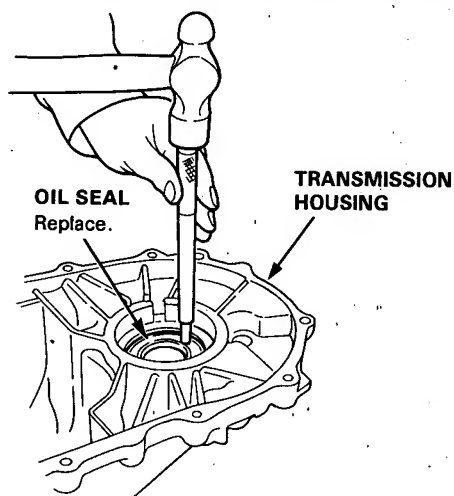
2. Install the final driven gear in the reverse order of removal.

## Oil Seal Removal

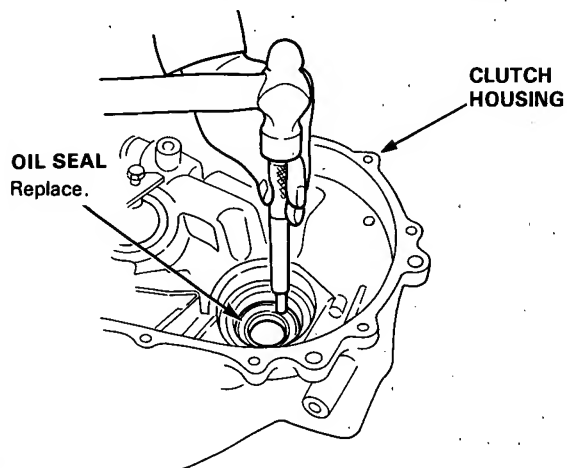
1. Remove the differential assembly.
2. Remove the thrust shim from the transmission housing.



3. Remove the oil seal from the transmission housing.



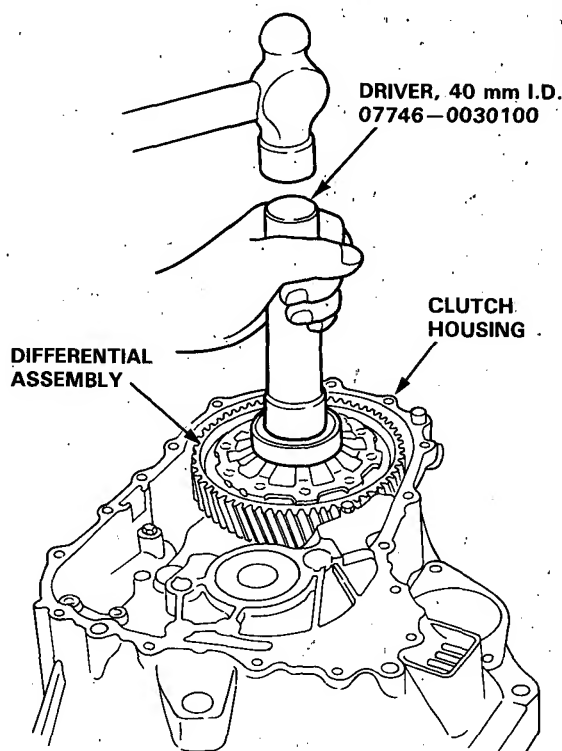
4. Remove the oil seal from the clutch housing.



# Differential

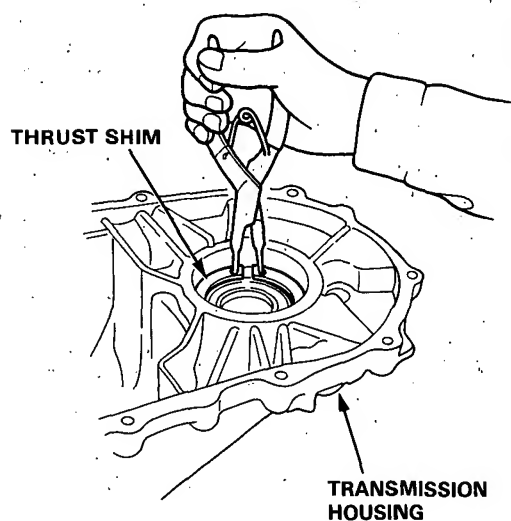
## Installation

1. Install the differential assembly in the clutch housing using the special tool as shown.



2. Install the thrust shim in the transmission housing.

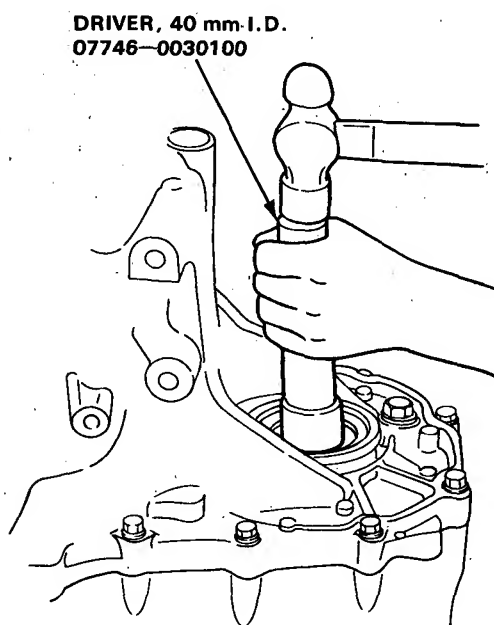
NOTE: Install the same size thrust shim that was removed.



3. Install the transmission housing (see section 13).

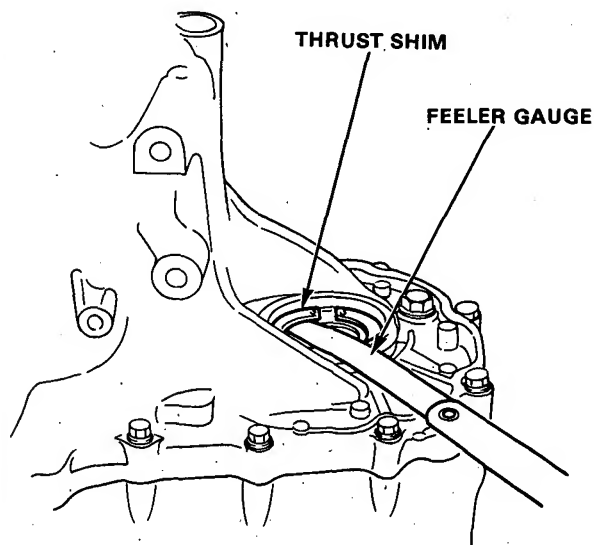
NOTE: Do not apply liquid gasket to the mating surface of the clutch housing.

4. Tighten the transmission housing mounting bolts (see section 13).
5. Use the special tool to bottom differential assembly in the clutch housing.



6. Measure clearance between thrust shim and bearing outer race of ball bearing in transmission housing.

Standard: 0-0.10 mm (0.004 in)





7. If the clearance is more than the standard, select a new thrust shim from the following table.

#### 80 mm Thrust Shim

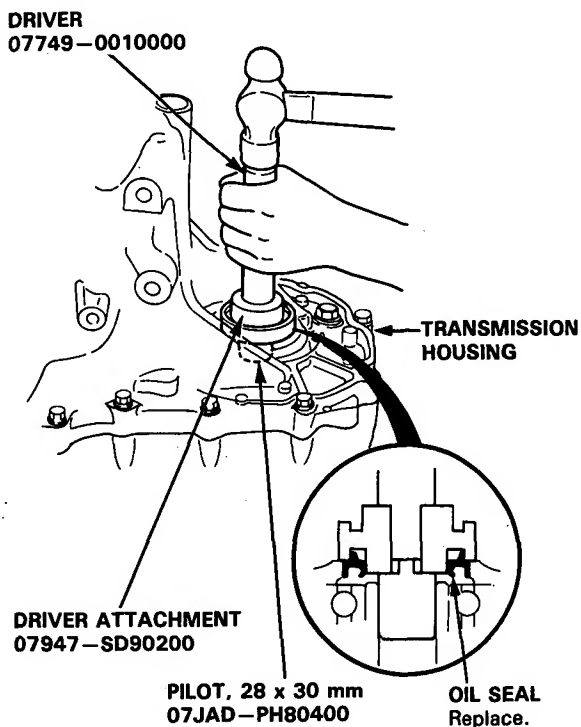
	Part Number	Thickness
1	41441-PL3-B00	1.0 mm (0.039 in)
2	41442-PL3-B00	1.1 mm (0.043 in)
3	41443-PL3-B00	1.2 mm (0.047 in)
4	41444-PL3-B00	1.3 mm (0.051 in)
5	41445-PL3-B00	1.4 mm (0.055 in)
6	41446-PL3-B00	1.5 mm (0.059 in)
7	41447-PL3-B00	1.6 mm (0.063 in)
8	41448-PL3-B00	1.7 mm (0.067 in)
9	41449-PL3-B00	1.8 mm (0.071 in)
10	41450-PL3-B00	1.05 mm (0.041 in)
11	41451-PL3-B00	1.15 mm (0.045 in)
12	41452-PL3-B00	1.25 mm (0.049 in)
13	41453-PL3-B00	1.35 mm (0.053 in)
14	41454-PL3-B00	1.45 mm (0.057 in)
15	41455-PL3-B00	1.55 mm (0.061 in)
16	41456-PL3-B00	1.65 mm (0.065 in)
17	41457-PL3-B00	1.75 mm (0.069 in)

NOTE: If the clearance measured in step 6 is within the standard, it is not necessary to go to step 10.

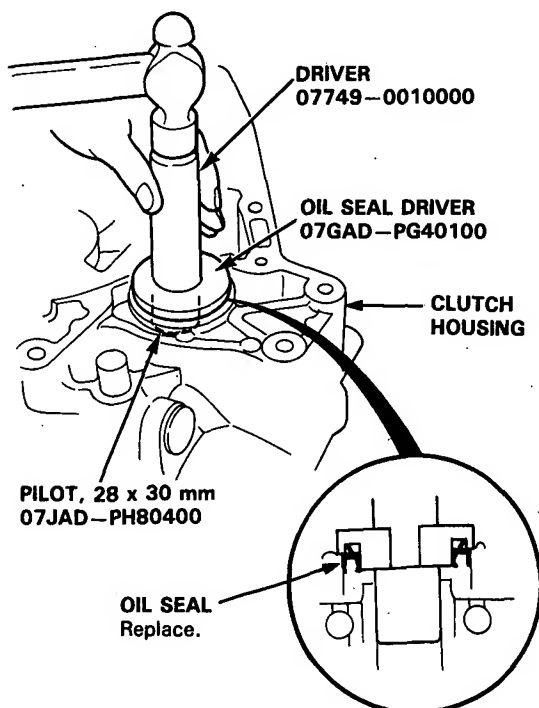
8. Remove the bolts and transmission housing (see section 13).
9. Replace the thrust shim with selected in step 7, then recheck the clearance.
10. Reassemble the transmission and install the transmission housing (see section 13).

## Oil Seal Installation

1. Install the oil seal in the transmission housing using the special tools as shown.



2. Install the oil seal in the clutch housing using the special tools as shown.







## **Differential (Automatic Transmission)**

**Special Tools ..... 15-10**

### **Differential**

**Illustrated Index ..... 15-11**

**Backlash Inspection ..... 15-12**

**Bearing Replacement ..... 15-12**

**Inspection/Disassembly ..... 15-13**

**Reassembly ..... 15-14**

**Oil Seal Removal ..... 15-15**

**Side Clearance Inspection ..... 15-16**

**Oil Seal Installation ..... 15-17**



# Special Tools

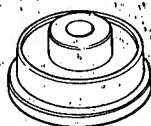
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07746-0030100	Driver, 40 mm I.D.	1	15-12, 16
②	07GAD-PG40100	Oil Seal Driver	1	15-17
③	07HAD-SF10100	Hub Bearing Driver Attachment	1	15-17
④	07JAD-PH80400	Pilot, 28 x 30 mm	1	15-17
⑤	07749-0010000	Driver	1	15-17



①



②



③



④

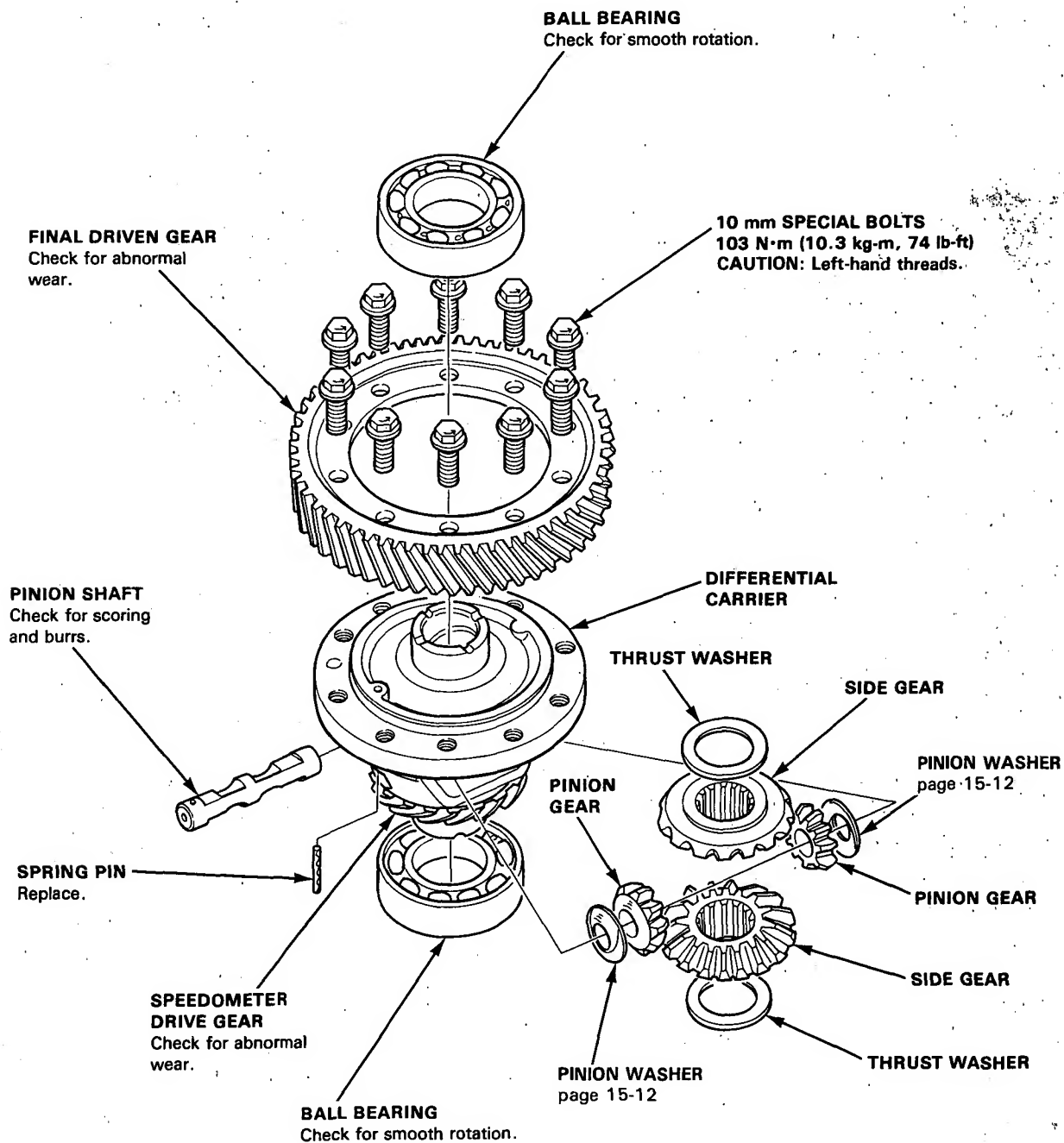


⑤

# Differential (Automatic Transmission)



## Illustrated Index



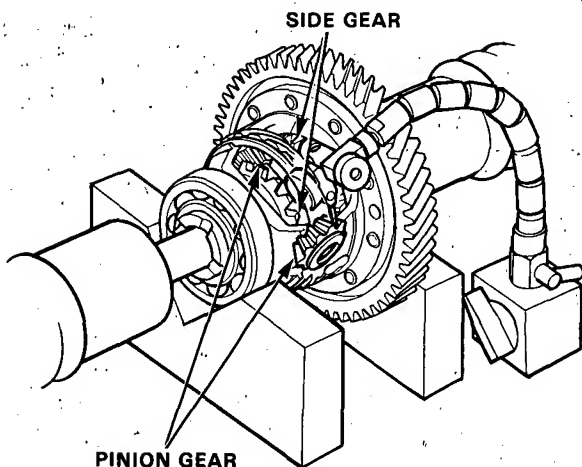
# Differential (Automatic Transmission)

## Backlash Inspection

1. Place the differential assembly on V-blocks and install both axles.

2. Check backlash of both pinion gears.

Standard (New): 0.05–0.15 mm  
(0.002–0.006 in.)



3. If out of tolerance, disassemble differential and select new pinion washers from the table below.

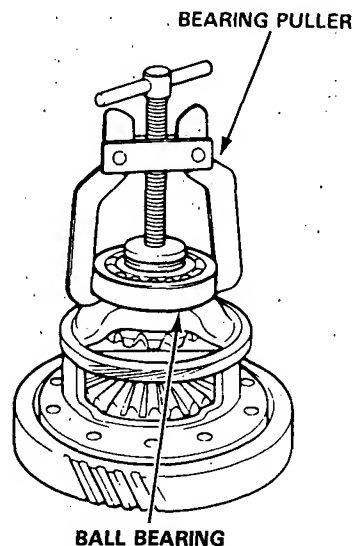
### PINION WASHER

Part No.	Thickness
41351-689-000	0.7 mm (0.028 in.)
41352-689-000	0.8 mm (0.031 in.)
41353-689-000	0.9 mm (0.035 in.)
41354-689-000	1.0 mm (0.039 in.)
41355-PC8-000	0.75 mm (0.030 in.)
41356-PC8-000	0.85 mm (0.033 in.)
41357-PC8-000	0.95 mm (0.037 in.)

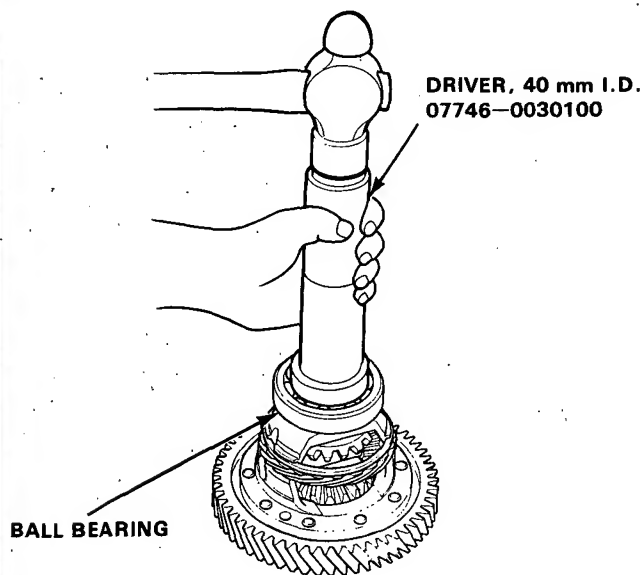
## Bearing Replacement

NOTE: Check bearings for wear and rough rotation. If bearings are OK, removal is not necessary.

1. Remove the ball bearings using a bearing puller as shown.



2. Install new ball bearings using the special tool as shown.

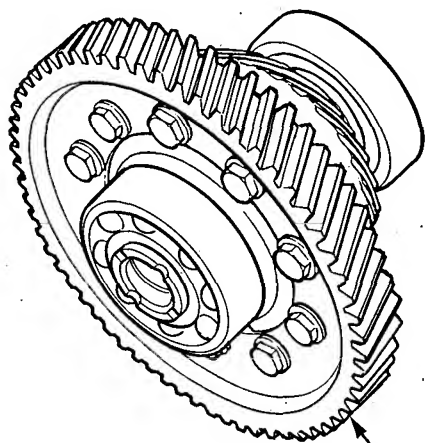




## Inspection/Disassembly

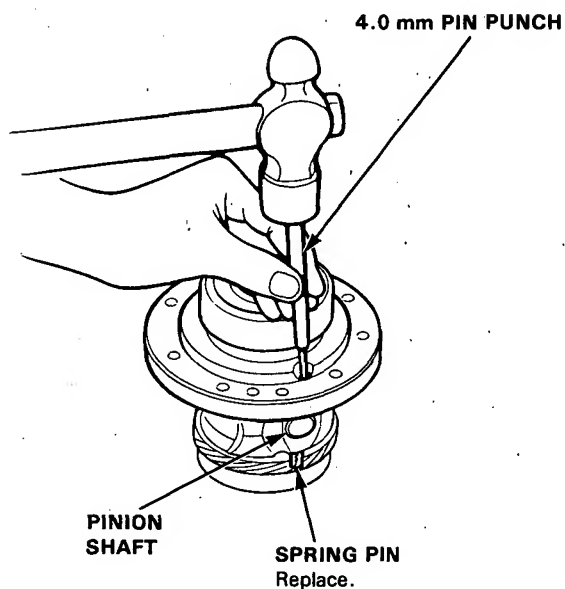
1. Remove final driven gear and inspect teeth for wear or damage.

NOTE: The final driven gear bolts have left-hand threads.

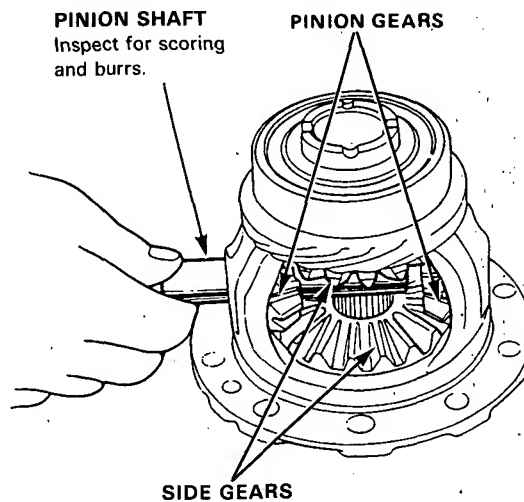


FINAL DRIVEN GEAR

2. Drive out the spring pin with a pin punch.



3. Remove pinion shaft, pinion gears, washers, side gears and thrust washers.



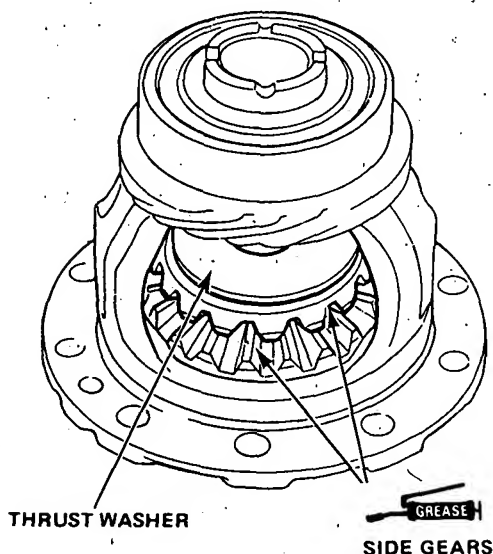
4. Wash parts thoroughly in solvent and dry with compressed air. Inspect all parts for wear or damage and replace any that are defective.

# Differential (Automatic Transmission)

## Reassembly

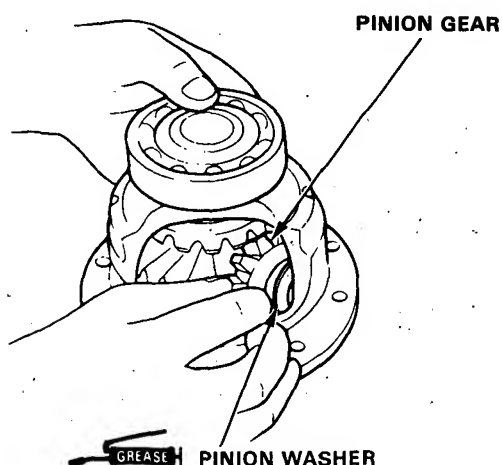
1. Install the side gears with thrust washers in the differential carrier.

**CAUTION:** Coat all gears with molybdenum disulfide grease on all sides.

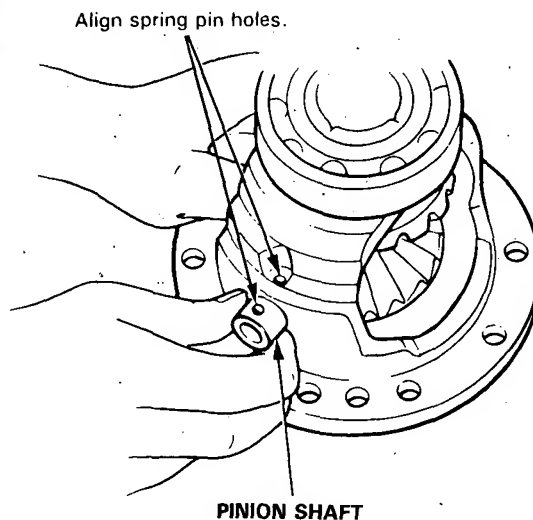


2. Set pinion gears in place exactly opposite each other in mesh with side gears, then install a thrust washer behind each one. Washers must be of equal thickness.

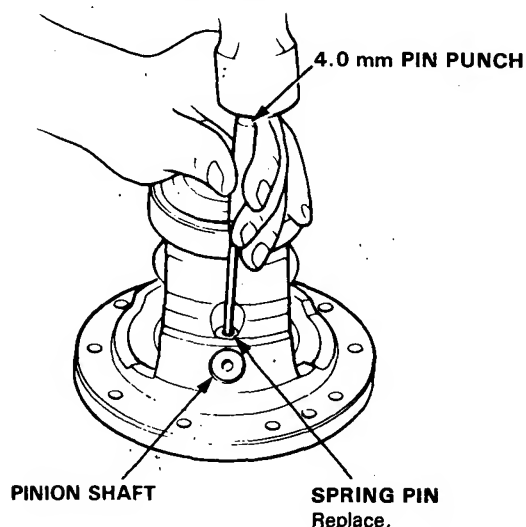
**NOTE:** Select the correct pinion washer from the table on page 15-12.



3. Rotate gears as shown until shaft holes in pinion gears line up with shaft holes in carrier.
4. Insert pinion shaft and align spring pin holes in one end with matching hole in carrier.



5. Drive in a new spring pin with a pin punch.



6. Check backlash of both pinion gears again.

**Standard (New):** 0.05–0.15 mm  
(0.002–0.006 in.)

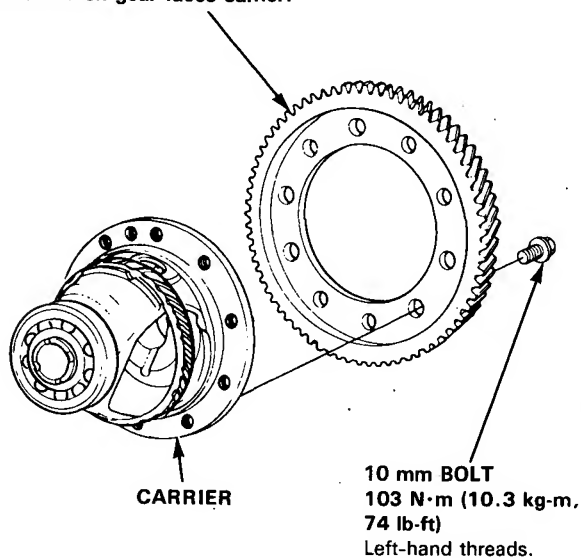
- If still out of tolerance, replace both pinion gears, then recheck backlash.
- If still out of tolerance, replace side gears, and recheck backlash.
- If still out of tolerance, replace carrier assembly.



7. Install final driven gear. Torque bolts to 103 N·m (10.3 kg-m, 74 lb-ft).

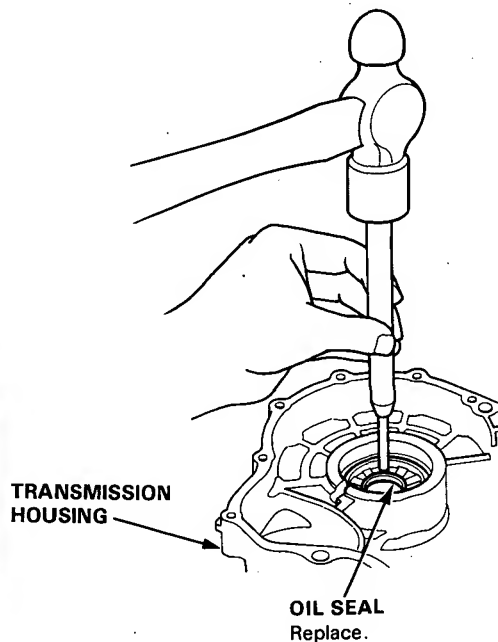
NOTE: Final driven gear bolts have left-hand threads.

**FINAL DRIVEN GEAR**  
Chamfer on inside diameter  
of final driven gear faces carrier.

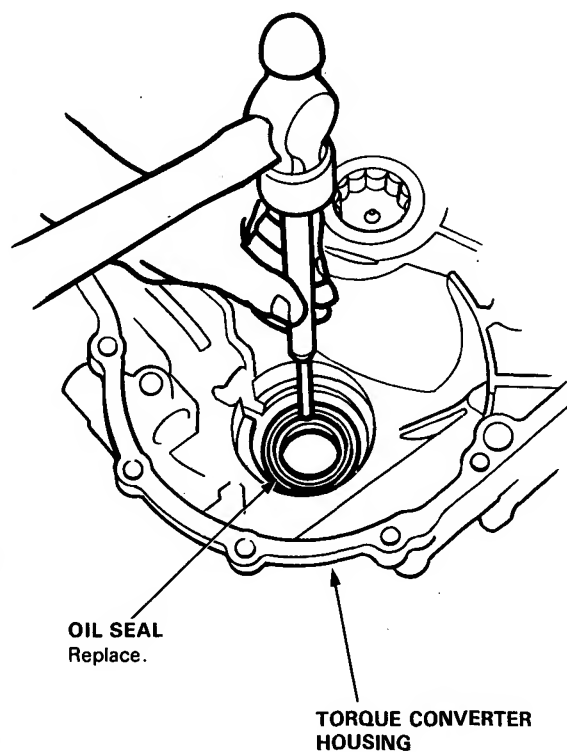


## Oil Seal Removal

1. Remove the differential assembly.
2. Remove the oil seal from the transmission housing.



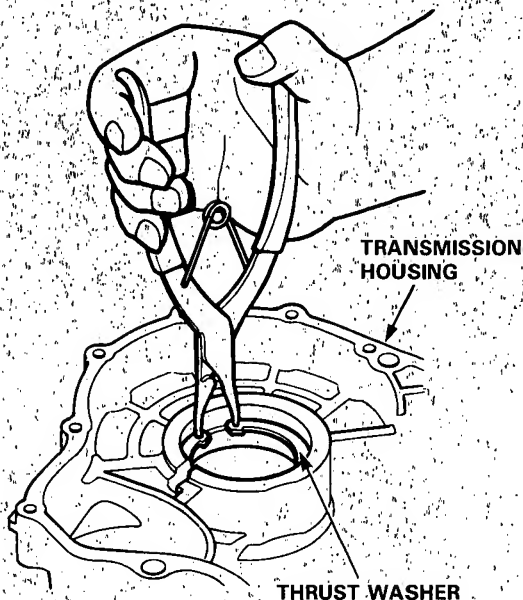
3. Remove the oil seal from the torque converter housing.



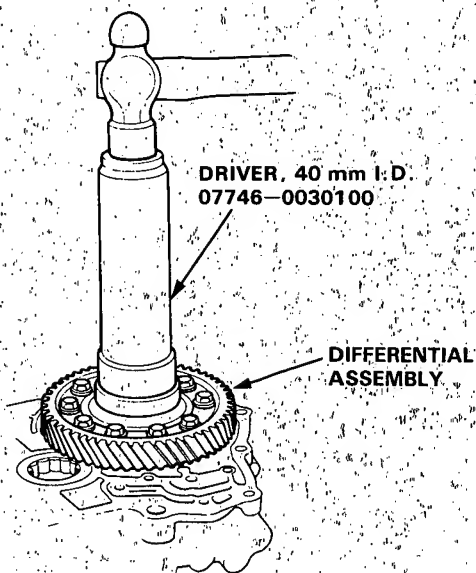
# Differential (Automatic Transmission)

## Side Clearance Inspection

1. Install a 2.50 mm (0.098 in) thrust washer in transmission housing.  
Do not install the oil seal yet.

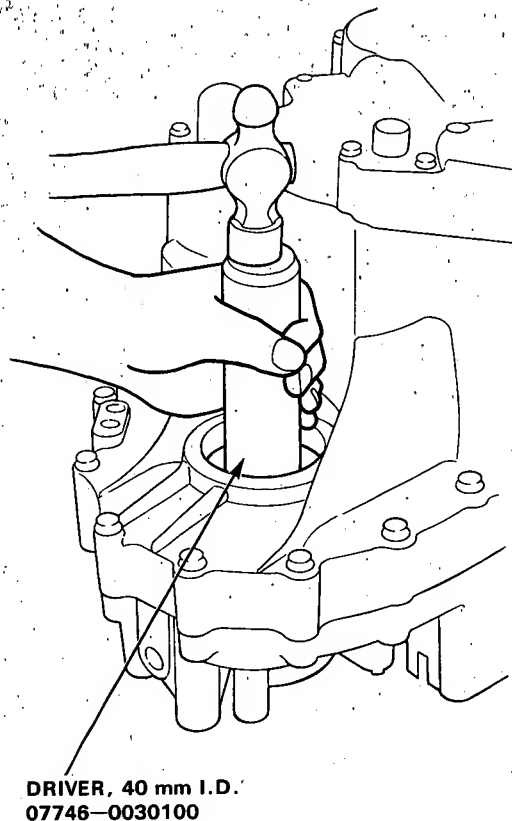


2. Install the differential assembly into the torque converter housing using the special tool as shown.

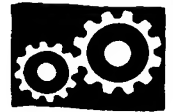


3. Assemble the transmission (see section 14).  
Install the transmission housing and tighten the bolts (see section 14).

4. Tap on transmission housing side of differential assembly with the special tools to seat the assembly in torque converter housing.

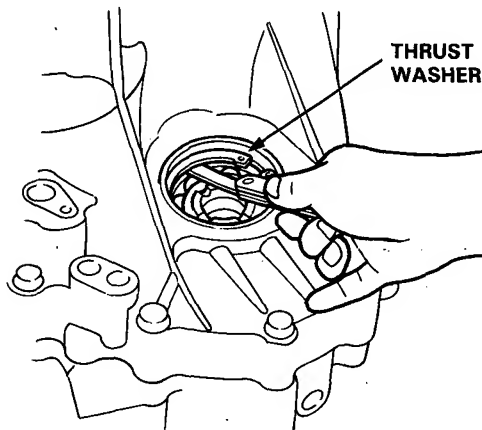






5. Measure clearance between the thrust washer and outer race of bearing in transmission housing.

**STANDARD: 0–0.15 mm (0–0.006 in)**



6. If out of limits, select new thrust washer from following table and install:

#### THRUST WASHER

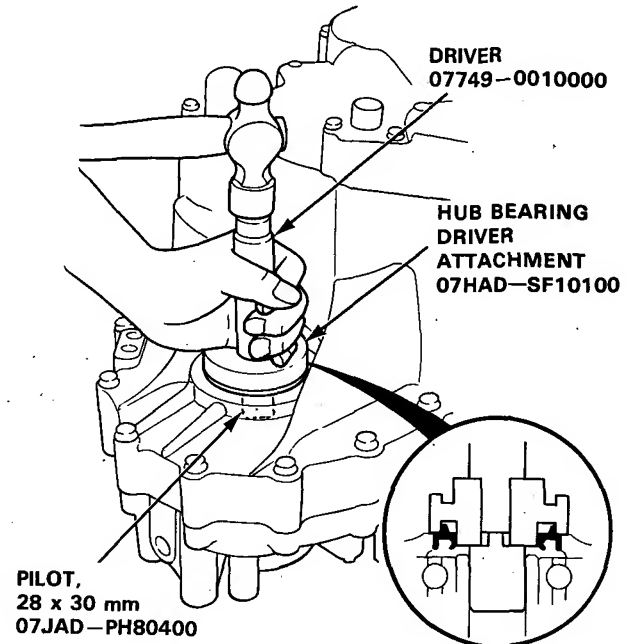
Part No.	Thickness
90414–689–000	2.50 mm (0.09843 in.)
90415–689–000	2.60 mm (0.10236 in.)
90416–689–000	2.70 mm (0.10630 in.)
90417–689–000	2.80 mm (0.11024 in.)
90418–689–000	2.90 mm (0.11417 in.)

**NOTE:** If the thrust washer-to-bearing outer race clearance calculated in step 5 is less than the specification, it is not necessary to do steps 7. and 8.

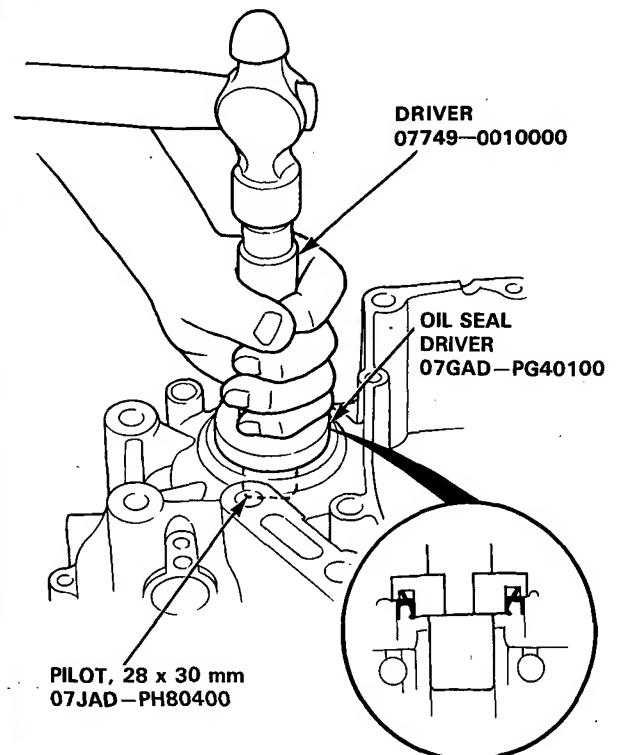
7. Remove the transmission housing.
8. Replace the 2.50 mm (0.098 in) thrust washer with the one of the correct thickness selected the step 5.
9. Install the transmission housing (see section 14).

## Oil Seal Installation

1. Install the oil seal into the transmission housing using the special tools as shown.



2. Install the oil seal into the torque converter housing using the special tools as shown.





## Driveshafts

Special Tools .....16-2

### Driveshafts

Removal .....16-3

Disassembly/Inspection .....16-4

Reassembly .....16-5

### Intermediate Shaft

Replacement .....16-8

Disassembly .....16-8

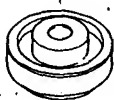
Index/Inspection .....16-9

Reassembly .....16-10

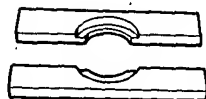


# Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAD-PG40100	Oil Seal Driver	1	16-10
②	07GAF-SD40700	Hub Dis/Assembly Base	2	16-8, 16-9, 16-10
③	07JAD-SH3010A	Seal Driver Attachment	1	16-10
④	07746-0010200	Attachment, 37 x 40 mm	1	16-8
⑤	07746-0010300	Attachment, 42 x 47 mm	1	16-9
⑥	07746-0030100	Driver, 40 mm I.D.	1	16-10
⑦	07749-0010000	Driver	1	16-8, 16-9, 16-10
⑧	07947-SD90101	Seal Driver Attachment	1	16-10
⑨	07965-MA60000	Attachment	1	16-9
⑩	07965-SD90100	Support Base	1	16-8, 16-10



①



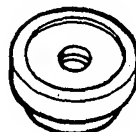
②



③



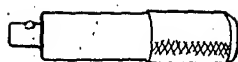
④



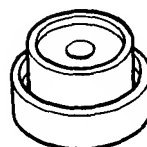
⑤



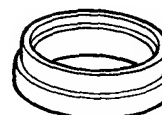
⑥



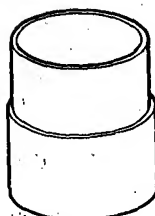
⑦



⑧



⑨



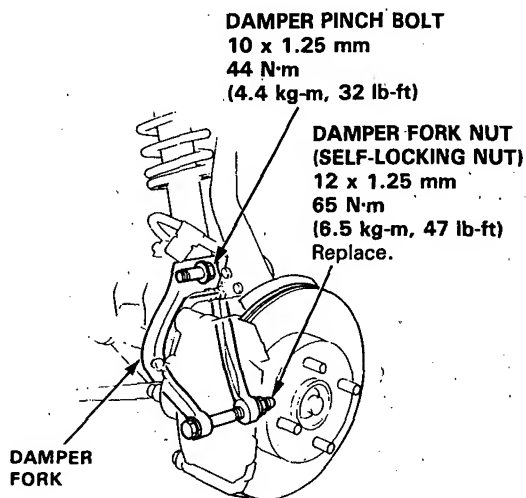
⑩

# Driveshafts

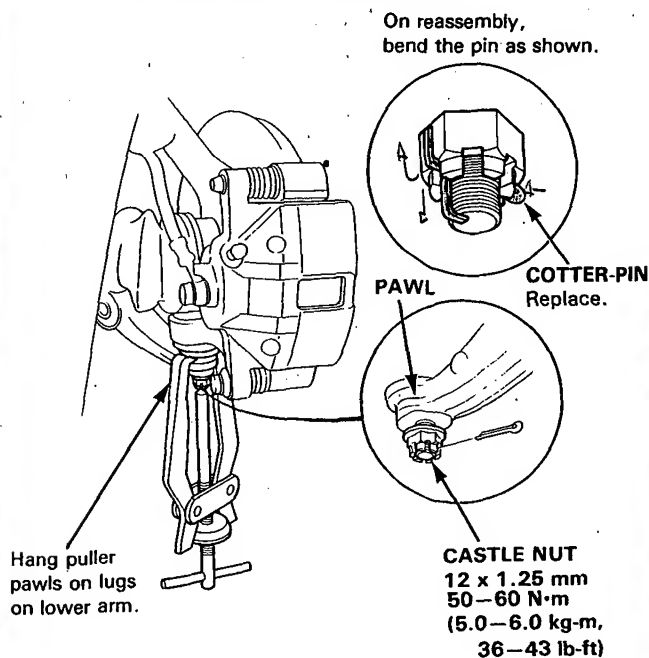


## Removal

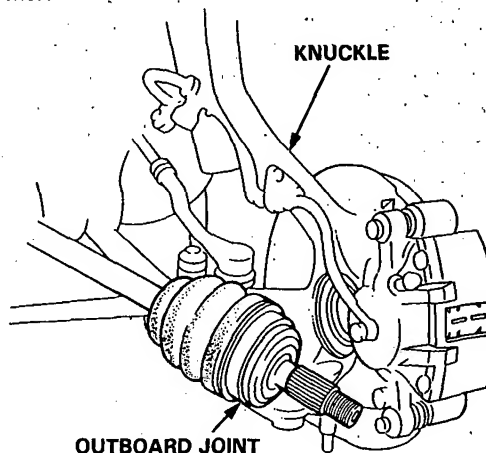
1. Loosen the wheel lug nuts slightly.
2. Raise the front end of the car and place safety stands in the proper locations. Remove the front wheels.
3. Drain the transmission oil or fluid (see section 15).
4. Raise the locking tab on the spindle nut and remove it (see page 18-11).
5. Remove the damper fork nut and damper pinch bolt. Remove the damper fork.



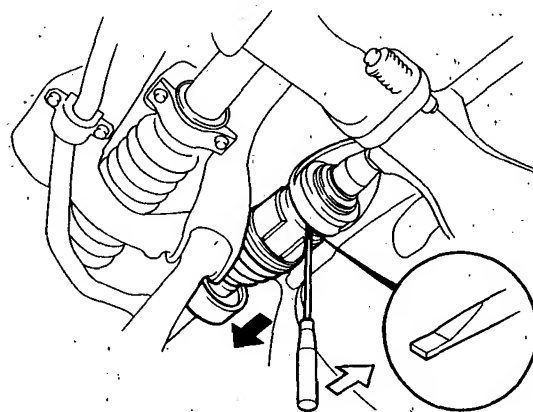
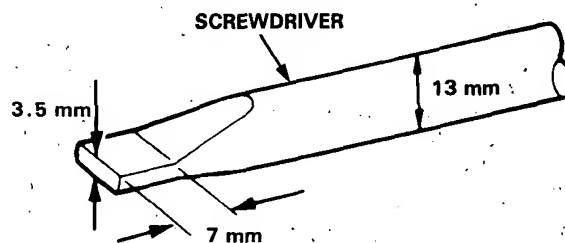
6. Remove the knuckle-to-lower arm castle nut, and separate the lower arm from the knuckle using a puller with the pawls applied to the lower arm.



7. Pull the knuckle outward and remove the driveshaft outboard joint from the knuckle using a plastic hammer.



8. Pry the driveshaft assembly with a screwdriver as shown to force the set ring at the driveshaft end past the groove.



9. Pull the inboard joint and remove the driveshaft and CV joint out of the differential case or intermediate shaft as an assembly.

### CAUTION:

- Do not pull on the driveshaft, as the CV joint may come apart.
- Use care when prying out the assembly and pull it straight to avoid damaging the differential oil seal (right side) or intermediate shaft dust seal (left side).

# Driveshafts

## Disassembly/Inspection

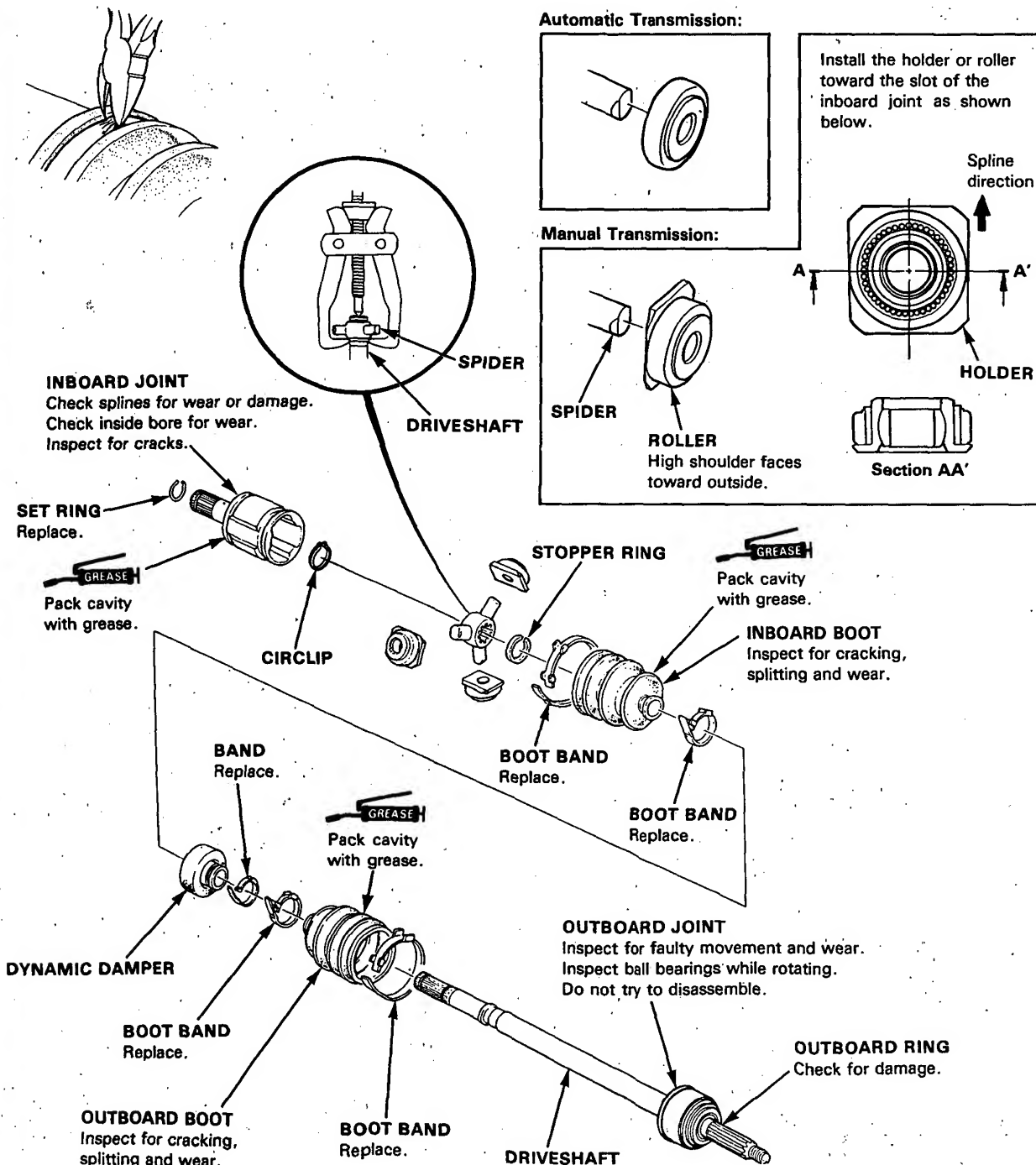
### NOTE:

- Mark the rollers and roller grooves during disassembly to ensure proper positioning during reassembly.
  - Before disassembly, mark the spider and driveshaft so they can be reinstalled in their original positions.
  - The inboard joint must be removed to replace the boots.
  - If the boot band is the welded type, cut off as shown.
- CAUTION:** Take care not to damage the boots.

**GREASE** : Thoroughly pack the inboard joint and both joint boots with joint grease included in the new driveshaft set.

### Grease Quantity:

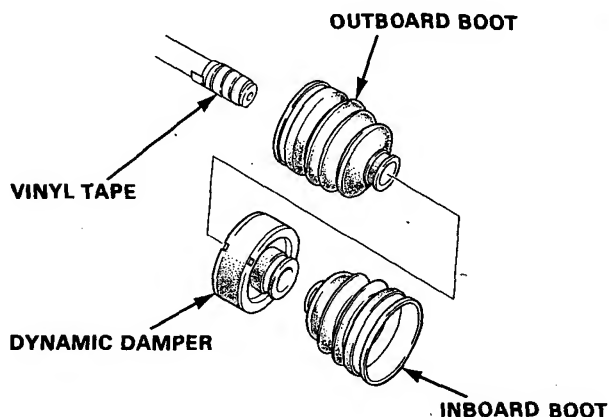
Inboard Joint	120–130 g (4.2–4.6 oz)
Outboard Joint	90–100 g (3.2–3.5 oz)





## Reassembly

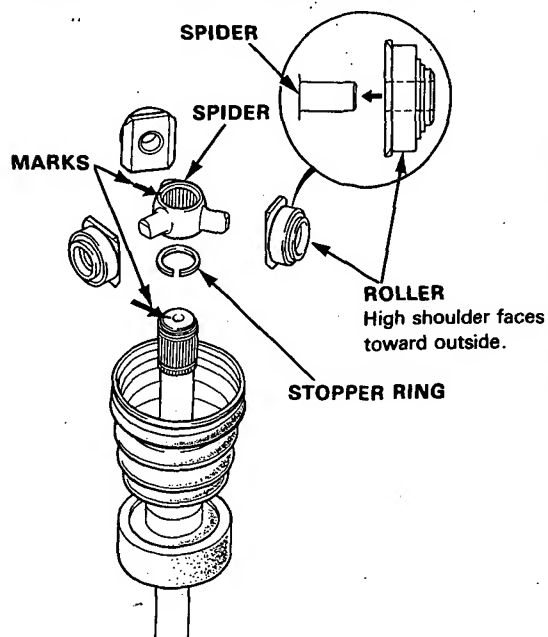
1. Wrap the splines with vinyl tape to avoid damaging the boots and dynamic damper.
2. Install the outboard boot, dynamic damper and inboard boot to the driveshaft, then remove the vinyl tape.



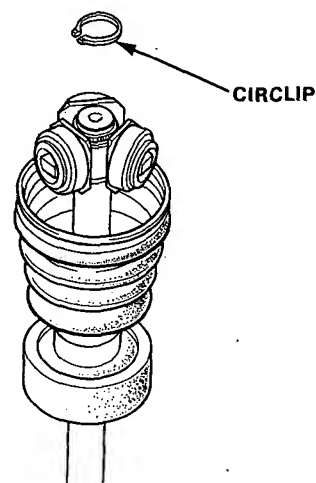
3. Install the stopper ring onto the driveshaft groove.
4. Install the spider on the driveshaft by aligning the marks on the spider and end of the driveshaft.
5. Fit the rollers to the spider with their high shoulders facing outward.

### CAUTION:

- Reinstall the rollers in their original positions on the spider.
- Hold the driveshaft assembly with the spider and rollers up, to prevent the spider from falling off.

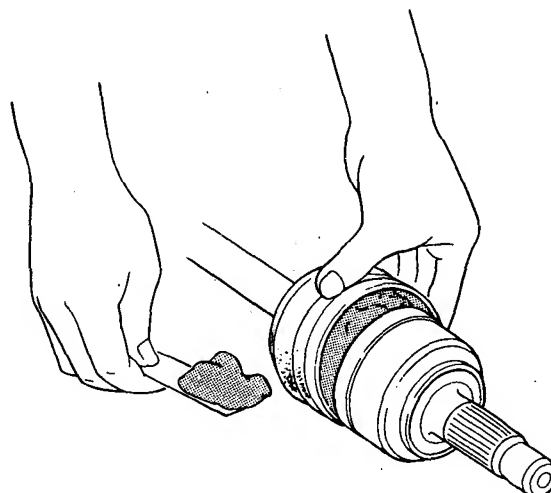


6. Fit the circlip onto the driveshaft groove.



7. Pack the outboard joint with joint grease included in the new driveshaft set.

**Grease Quantity: 90–100 g (3.2–3.5 oz)**



(cont'd)

# Driveshafts

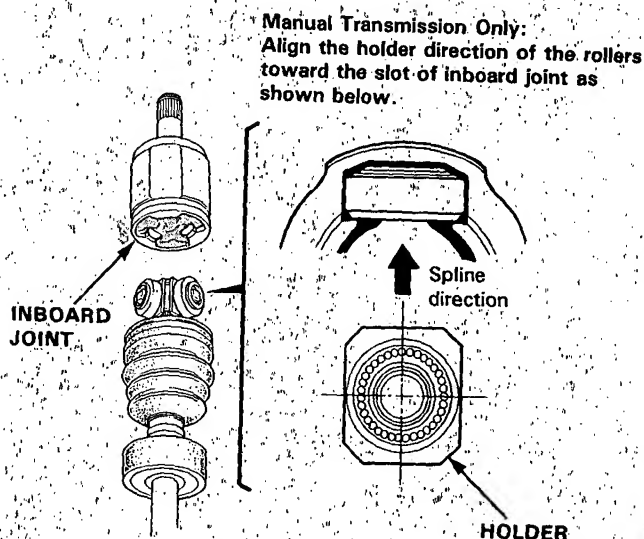
## Reassembly (cont'd)

8. Pack the inboard joint with joint grease included in the new driveshaft set.

**Grease Quantity:** 120–130 g (4.2–4.6 oz)

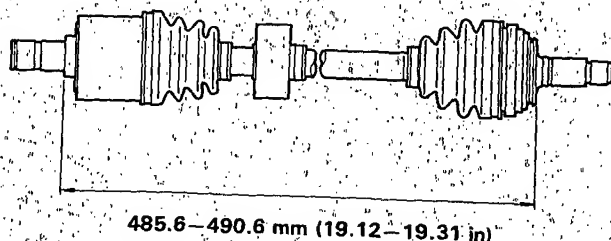
9. Fit the inboard joint onto the driveshaft.

**CAUTION:** Hold the driveshaft assembly with the inboard joint up, to prevent the spider from falling off.



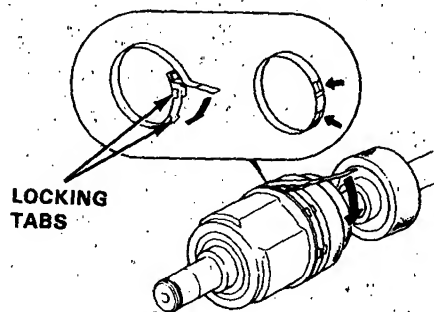
10. Adjust the length of the driveshafts to the figure below, then adjust the boots to halfway between full compression and extension.

**NOTE:** The ends of boots seat in the grooves of the driveshaft and joint.



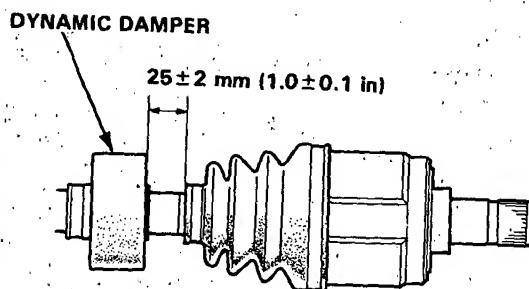
11. Install new boot bands on the boot and bend both sets of locking tabs.

12. Lightly tap on the doubled-over portions to reduce their height.



13. Position the dynamic damper as shown below.

- Install a new dynamic damper band and bend down both sets of locking tabs.
- Lightly tap on the doubled-over portion of the band to reduce its height.



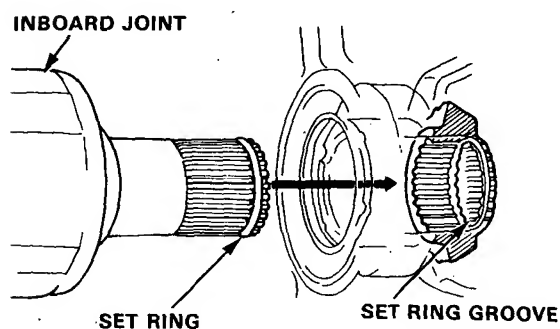




14. Install a new set ring in the driveshaft groove.
15. Install the inboard end of the driveshaft into differential or intermediate shaft.

**CAUTION:**

- Always use a new set ring whenever the driveshaft is being installed.
- Make sure the driveshaft locks in the differential side gear groove, and the CV joint subaxle bottoms in the differential or intermediate shaft.



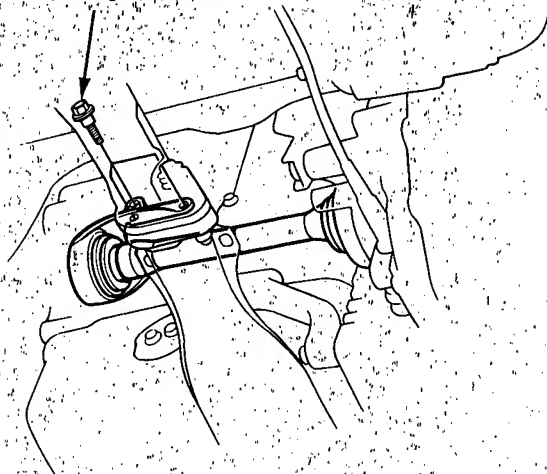
16. Refill the transmission, with recommended oil or fluid (see section 15).

# Intermediate Shaft

## Replacement

1. Drain the oil or fluid from the transmission (see section 15).
2. Remove the left driveshaft assembly (see page 16-3).
3. Remove the three bolts.

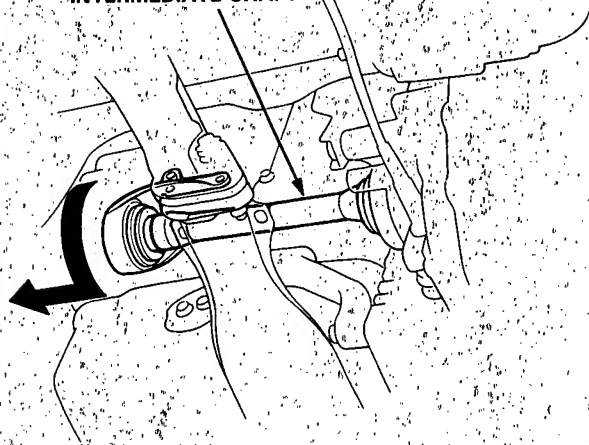
**BOLT**  
10 x 1.25 mm  
40 N·m (4.0 kg·m, 29 lb·ft)



4. Lower the bearing support close to the steering gear box and remove the intermediate shaft from the differential.

**CAUTION:** To prevent damage to the differential oil seal, hold the intermediate shaft horizontal until it is clear of the differential.

**INTERMEDIATE SHAFT**

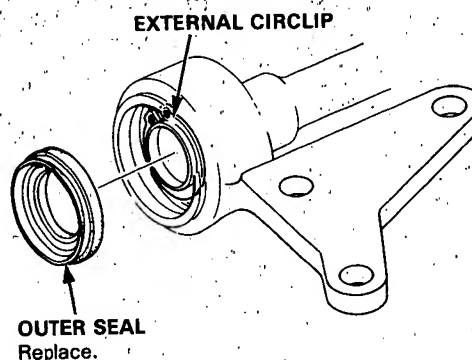


5. Install in the reverse order of removal.

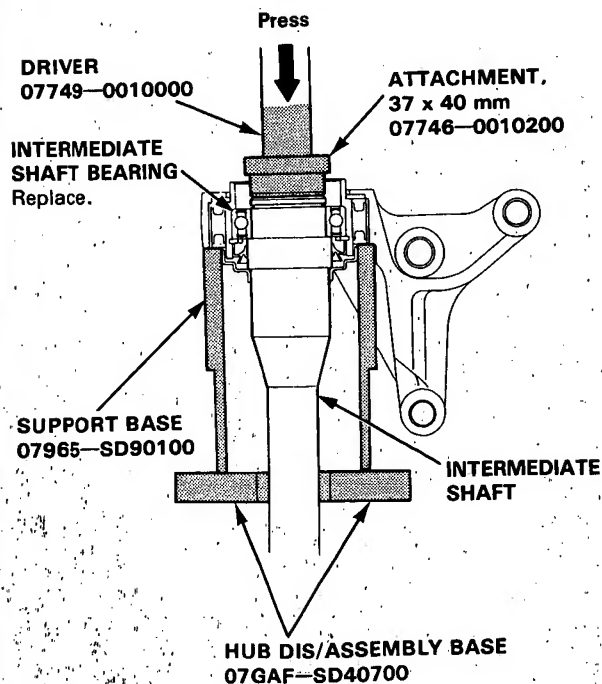
## Disassembly

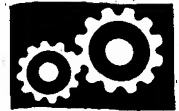
**NOTE:** Be careful not to damage the rubber on the bearing support or metal rings on the intermediate shaft during disassembly.

1. Remove the intermediate shaft outer seal.
2. Remove the external circlip.

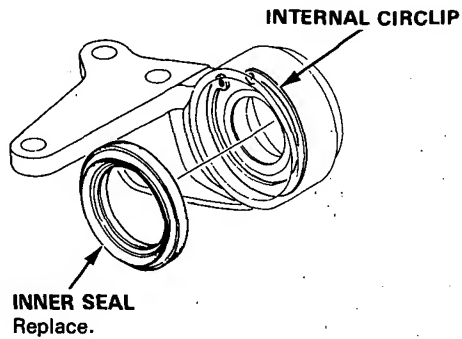


3. Press the intermediate shaft out of the shaft bearing using the special tools and a hydraulic press as shown.

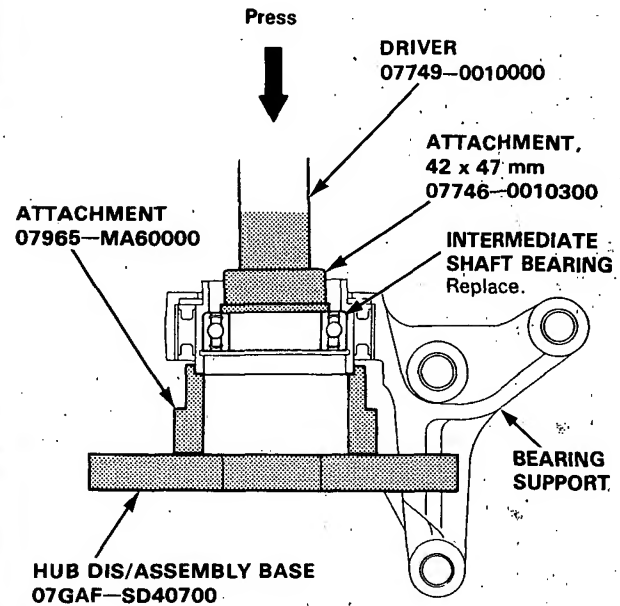




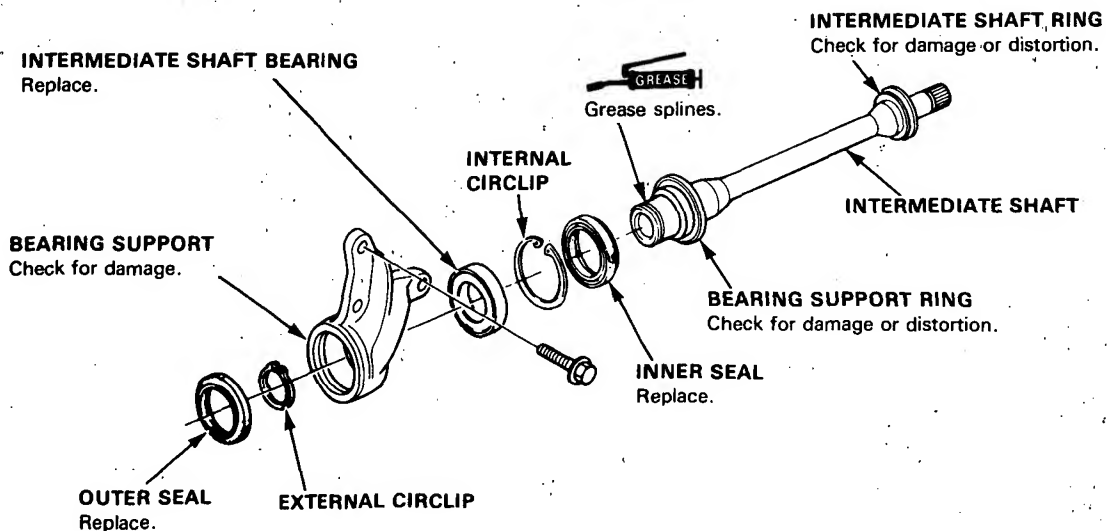
4. Remove the intermediate shaft inner seal.
5. Remove the internal circlip.



6. Press the intermediate shaft bearing out of the bearing support using the special tools and a press as shown.



## Index/Inspection

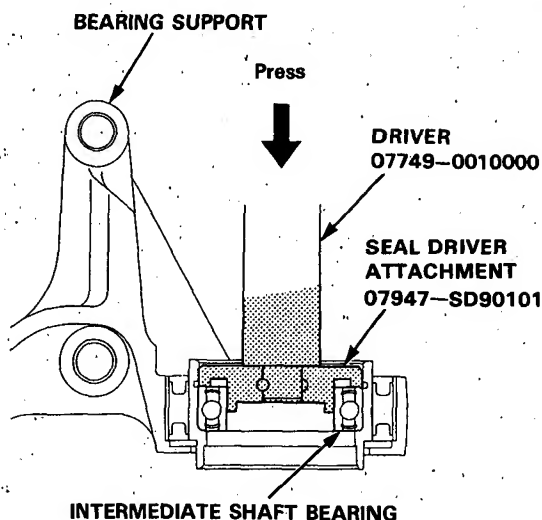


# Intermediate Shaft

## Reassembly

**NOTE:** Be careful not to damage the rubber on the bearing support or metal rings on the intermediate shaft during reassembly.

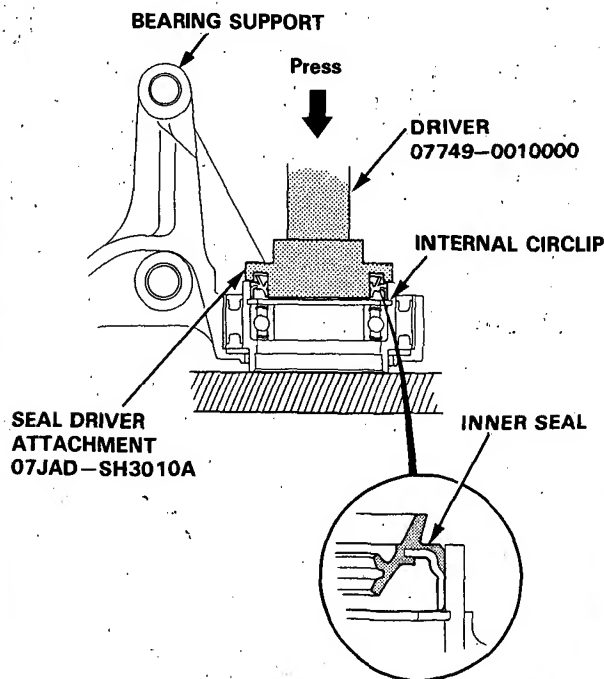
1. Press the intermediate shaft bearing into the bearing support using the special tools and a hydraulic press as shown.



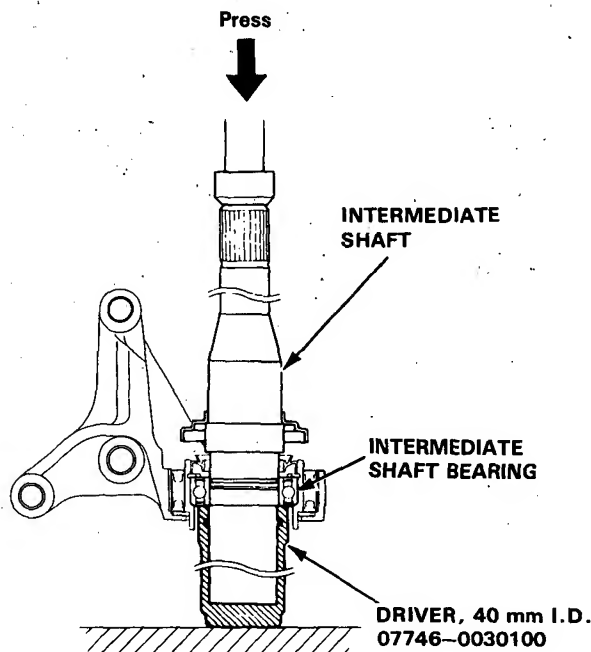
2. Seat the internal circlip in the groove of the bearing support.

**CAUTION:** Install the circlip with the tapered end facing out.

3. Press the intermediate shaft inner seal into the bearing support using the special tools and a press as shown.



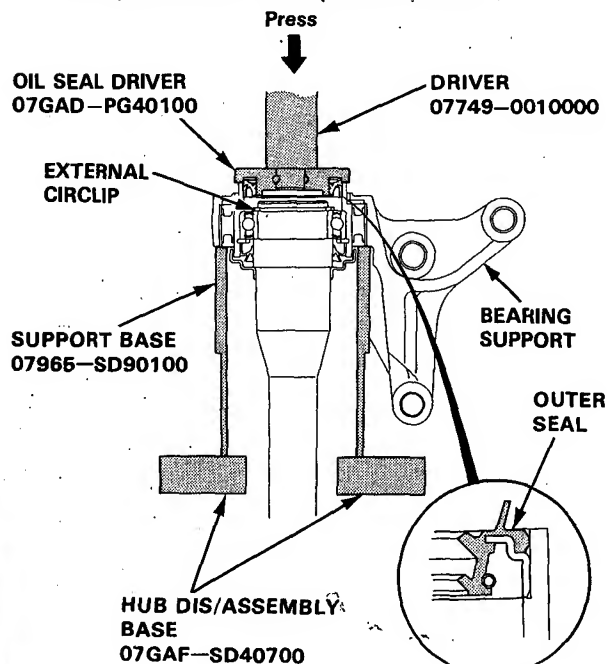
4. Press the intermediate shaft into the shaft bearing using the special tools and a press as shown.



5. Seat the external circlip in the groove of the intermediate shaft.

**CAUTION:** Install the circlip with the tapered end facing out.

6. Press the outer seal into the bearing support using the special tools and a press as shown.



# Steering

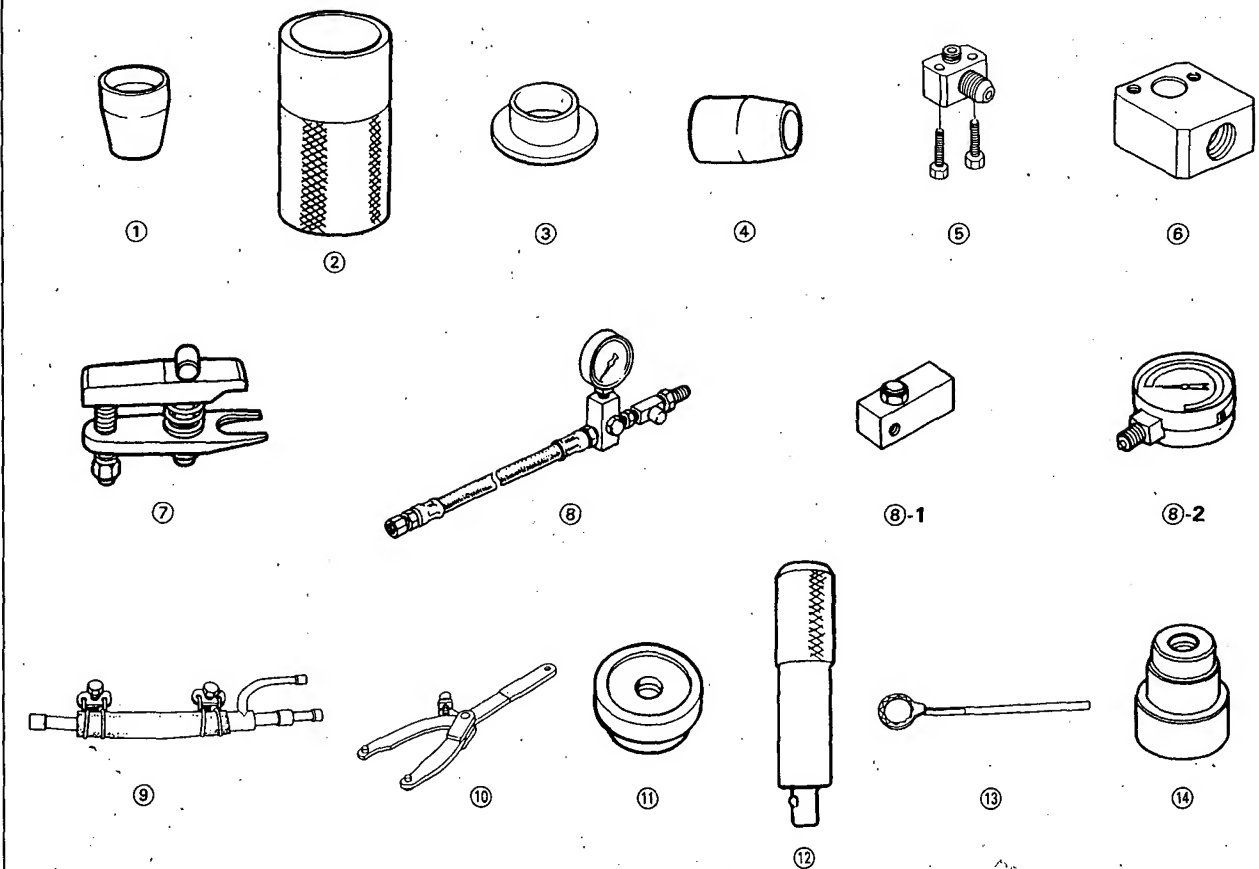
Special Tools .....	17-2
Component Location	
Index .....	17-3
System Description	
Fluid Flow Diagram .....	17-4
Steering Pump .....	17-5
Fluid Reservoir/Filter .....	17-6
4-Way Valve .....	17-7
Full-Lock Unloader System .....	17-9
Power Steering Speed Sensor .....	17-9
Troubleshooting	
General Troubleshooting .....	17-12
Noise and Vibration .....	17-15
Fluid Leaks .....	17-16
Maintenance	
Pump Belt Adjustment .....	17-17
On-Car Checks	
Rack Guide Adjustment .....	17-18
Fluid Replacement .....	17-18
Pump Pressure Check .....	17-19
Steering Wheel Rotational Play .....	17-20
Power Assist Check	
With Car Parked .....	17-20
Assist Check .....	17-21
Power Steering Speed Sensor	
Replacement .....	17-21

Steering Column	
Removal .....	17-22
Disassembly/Inspection .....	17-25
Reassembly .....	17-26
Installation .....	17-28
Steering Wheel	
Disassembly/Reassembly .....	17-31
Steering Pump	
Illustrated Index .....	17-32
Replacement .....	17-33
Preload Inspection .....	17-33
Pulley Replacement .....	17-34
Flow Control Valve Inspection	
and Replacement .....	17-34
Housing Disassembly .....	17-37
Housing Reassembly .....	17-38
Steering Gearbox	
Valve Body Unit Removal .....	17-40
Valve Body Unit Overhaul .....	17-40
Valve Body Unit Installation .....	17-45
Illustrated Index .....	17-46
Steering Rack Removal .....	17-47
Steering Gearbox Overhaul .....	17-49
Steering Gearbox Installation .....	17-64



# Special Tools

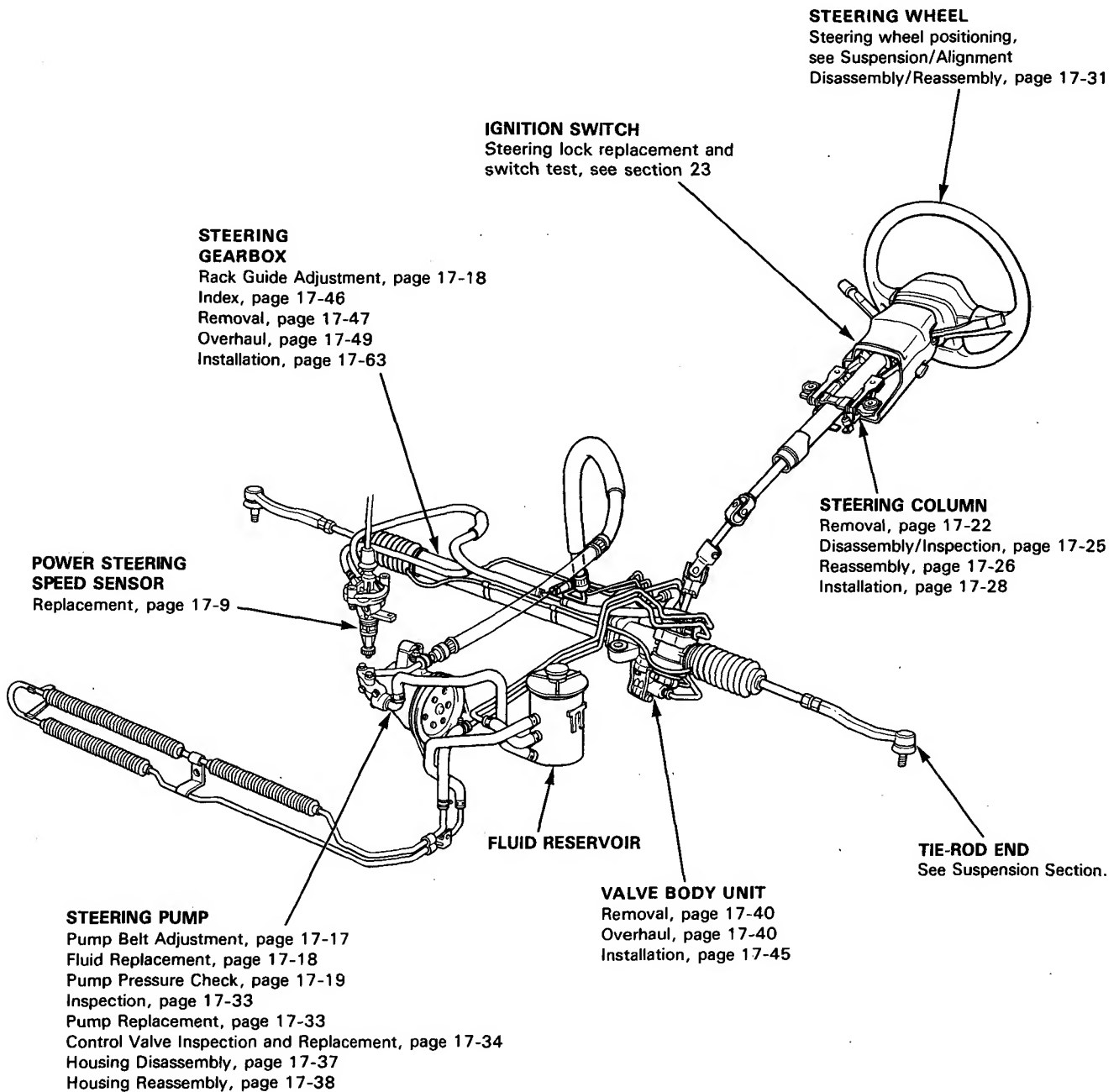
Ref. No.	Tool Number	Description	Qty	Page Reference
*①	07GAG—SD40100	Piston Seal Ring Guide	1	17-55
*②	07GAG—SD40200	Piston Seal Ring Sizing Tool	1	17-55
*③	07GAG—SD40300	Cylinder End Seal Slider	1	17-56
*④	07GAG—SD40400	Cylinder End Seal Guide	1	17-58
⑤	07GAK—SE00110	P/S Joint Adapter (Pump)	1	17-19
⑥	07GAK—SE00120	P/S Joint Adapter (Hose)	1	17-19
⑦	07MAC—SL00200	Ball Joint Remover, 28 mm	1	17-47
⑧	07406—0010001	P/S Pressure Gauge Set	1	17-19
⑧-1	07406—0010300	Pressure Control Valve	1	17-19
⑧-2	07406—0010400	Pressure Gauge	1	17-19
⑨	07406—0010101	Bypass Tube Joint (Included with 07406—0010001)	1	17-11
⑩	07725—0030000	Universal Holder	1	17-34
⑪	07746—0010300	Attachment 42 x 47 mm	1	17-53, 17-59, 17-60
⑫	07749—0010000	Driver	1	17-53, 17-60
⑬	07916—SA50001	Locknut Wrench 40 mm	1	17-18, 17-62
⑭	07947—6340300	Driver Attachment	1	17-60



\*Included in P/S Seal Tool Kit 07GAG—SD40000

# Component Location

## Index



# System Description

## Fluid Flow Diagram

The reservoir supplies power steering fluid to the pump; the pump pressurizes the fluid to about 8,000 kPa (80 kg/cm<sup>2</sup>, 1,200 psi), and delivers it through a high pressure hose to the valve body unit on the gearbox.

The 4-way valve (in the valve body unit) controls the direction of the turn by shifting fluid to the left or right side of the piston on the rack (in the power cylinder).

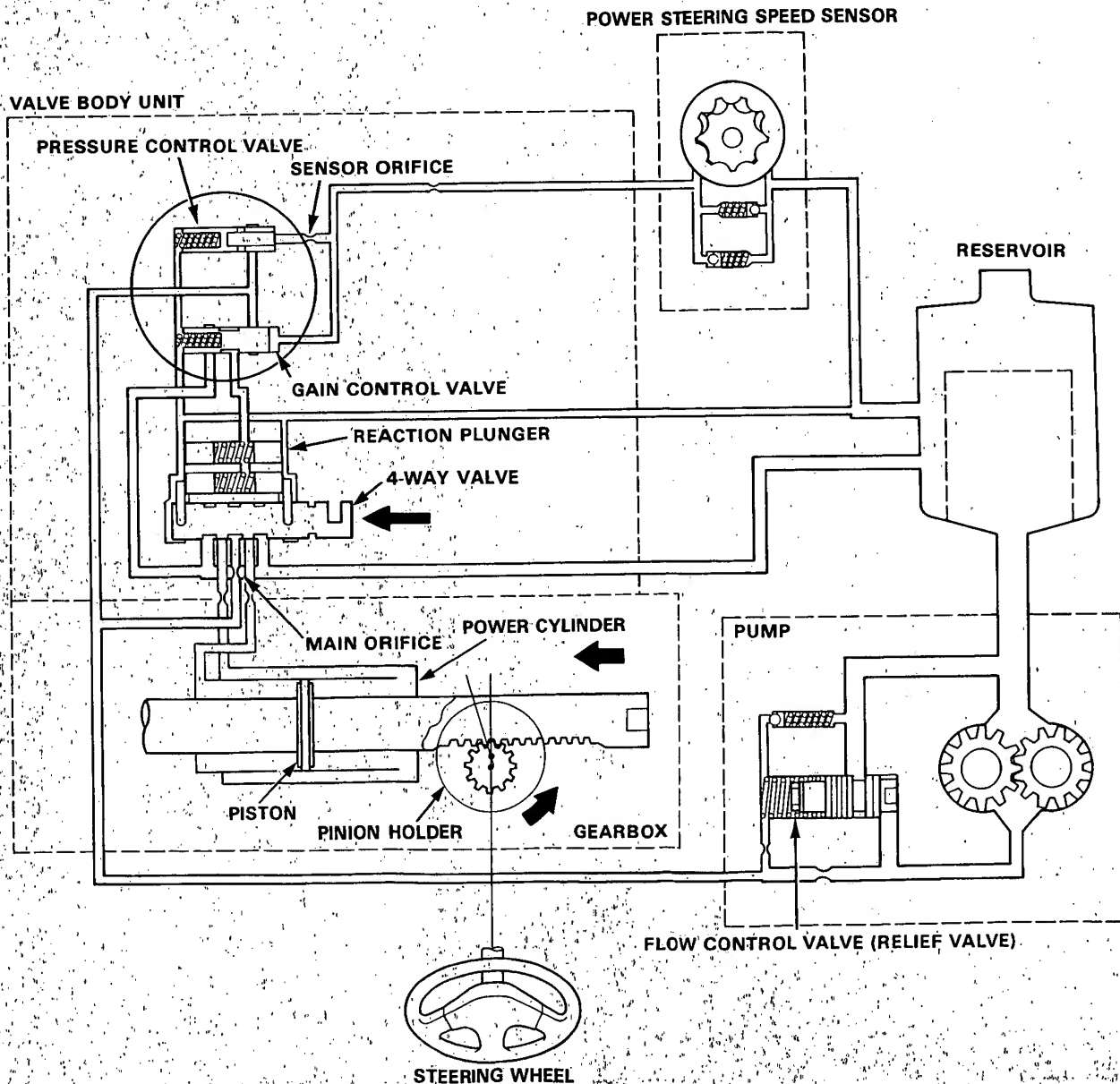
The gain control valve, in the valve body unit controls the amount of the assist by regulating the stroke of the 4-way valve.

The operation of the gain control valve is effected by the fluid pressure, which is regulated by the pressure control valve, sensor orifice and power steering speed sensor.

The constant pressure is generated by the pressure control valve. This pressure is used as a reference pressure for the response to the car speed. By introducing this pressure to the power steering speed sensor through the sensor orifice, the pressure downstream of the orifice is changed according to the speed of car. This pressure is then used to operate the gain control valve.

Two orifices are provided around the circumference of the gain control valve. These orifices provide the stepless reduction of the pressure from the pump according to the changes in the car speed. The reduced pressure is then sent to the reaction chambers. Therefore the assist varies by regulating the fluid pressure in the valve body unit according to the speed of car.

Fluid returning from the power cylinder flows back through the 4-way valve and out to the reservoir through the cooler.

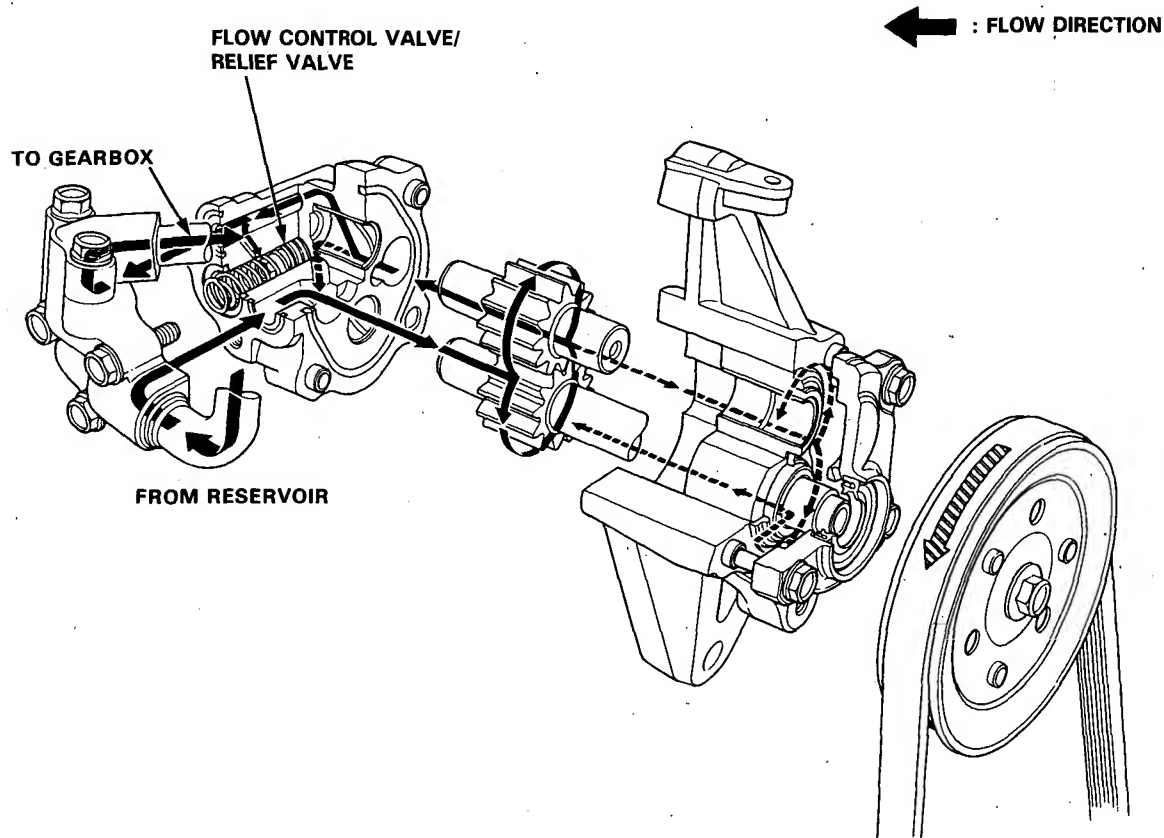






## Steering Pump

The power steering pump is mounted at the left front corner of the engine and is driven by a ribbed-belt from the crankshaft pulley. It uses a combination flow control valve/relief valve to keep output pressure between 8,000–9,000 kPa (80–90 kg/cm<sup>2</sup>, 1,135–1,280 psi). The pump is made of aluminum to reduce its weight and help it run cooler. It uses the a pressure balance system which allows fluid pressurized by the pump to flow behind two "floating" plungers, automatically maintaining the correct clearance between the other ends of the plungers, and the pump gears. This not only increases pump efficiency, but also improves durability, since the plungers can move to compensate for the expansion caused by high temperatures; otherwise the clearance would decrease, allowing more rapid pump wear.



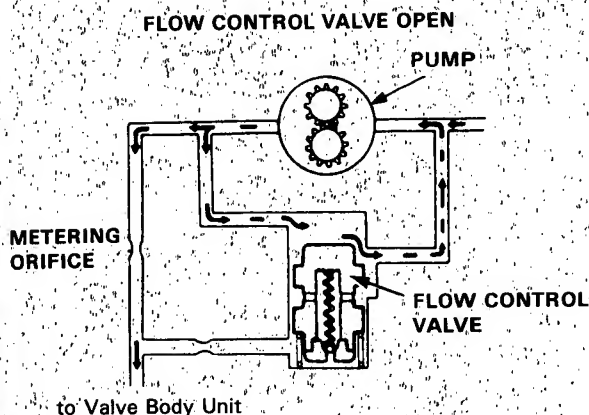
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# System Description

## Steering Pump (cont'd)

### Flow Control Valve

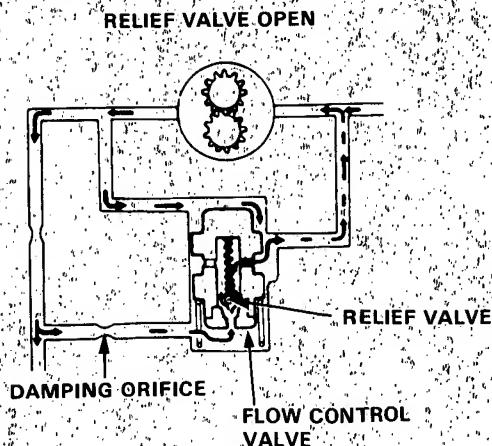
Fluid from the pump runs through a metering orifice to the valve body unit. This creates a pressure difference between the pump and valve body unit sides of the orifice. When pressure in the pump side is higher than the force of the spring holding the flow control valve closed, it pushes the valve down (open), and excess fluid returns to the pump inlet. The combined effect of the metering orifice and the flow control valve provides a relatively constant flow of fluid to the valve body unit.



### Pressure Relief Valve

As pressure on the valve body unit side builds up it pushes the relief valve ball (inside the flow control valve) up against its spring, and excess fluid returns to the pump inlet. As the pressure under the flow control valve drops, the relief valve ball is closed by its spring, and the flow control valve is forced down again, allowing excess fluid from the pump side to return to the inlet.

This flow control valve/relief valve cylinder keeps pump output pressure between 8,000–9,000 kPa (80–90 kg/cm<sup>2</sup>, 1,138–1,280 psi).

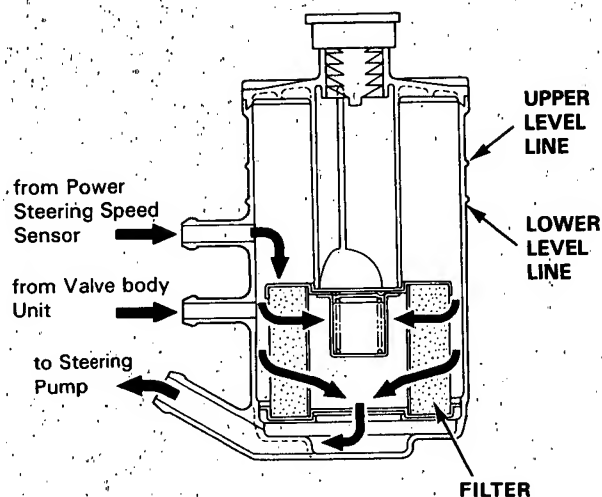


## Fluid Reservoir/Filter

A one piece reservoir and filter is attached to the fender apron on the left side of the engine compartment.

The fluid and the filter/reservoir should be replaced if the system is opened for repairs, or if the fluid gets water or dirt in it.

**CAUTION:** Use only Honda Power Steering Fluid-V. The use of other fluids such as A.T.F., or other manufacturer's power steering fluid will cause damage to the system.



**Reservoir Capacity ... 0.5 liter (0.5 US qt., 0.4 Imp qt.)**  
**System Capacity ... 1.4 liter (1.5 US qt., 1.2 Imp qt.)**



## 4-Way Valve

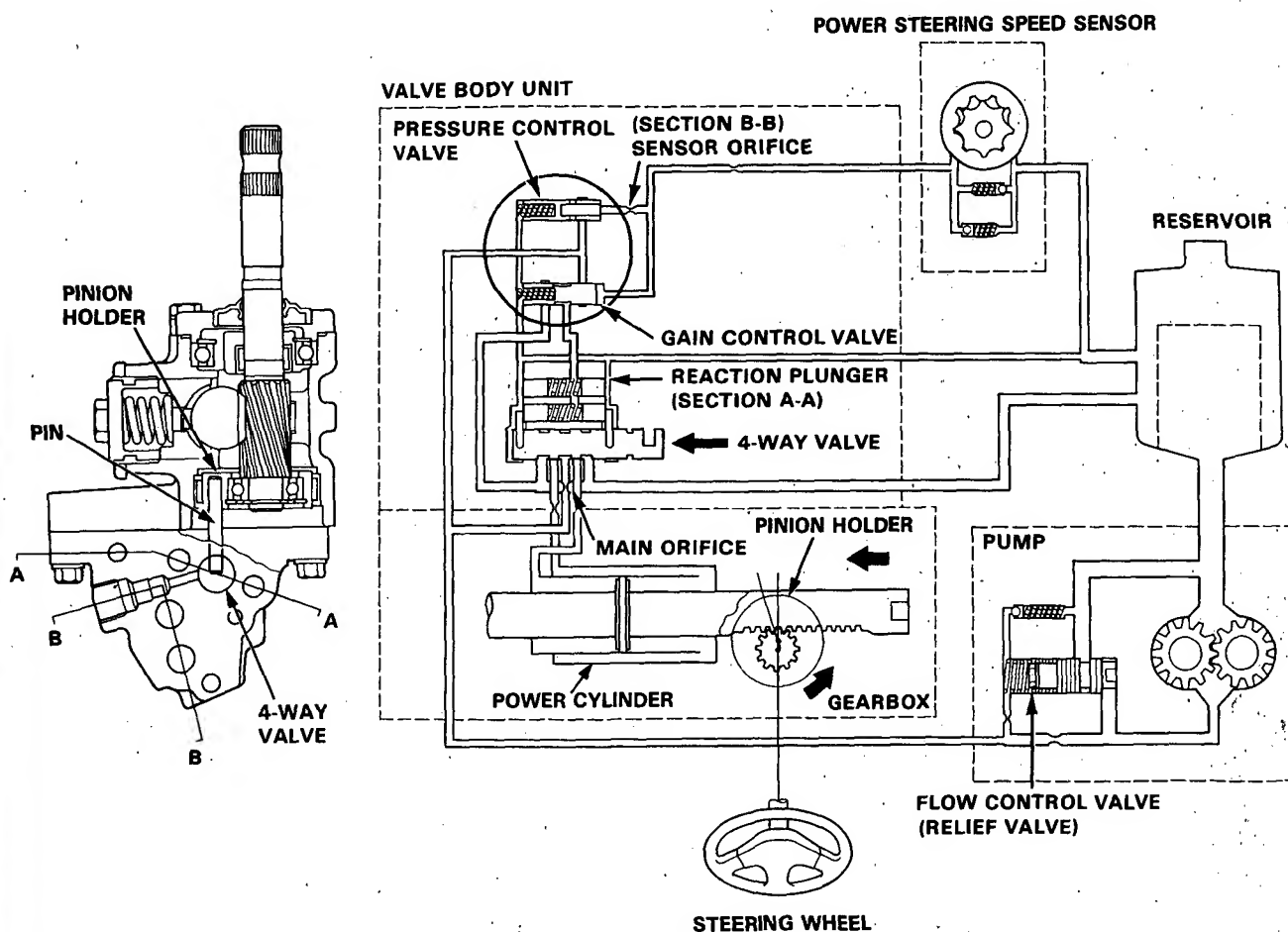
Mounted on the lower side of the gearbox is a 4-way valve that is moved horizontally by a pin on the pinion holder to shift fluid pressure to the right or left side of the power cylinder when the steering wheel is turned.

It has thrust pins at both ends, and two inter-connected reaction chambers, one on each side.

Each reaction chamber contains a pair of spring loaded plungers that rise against right and left thrust pins.

The valve body fluid passages are controlled by the 4-way valve.

Fluid pressure in the reaction chambers is reduced by the gain control valve in order to change the amount of the assist in accordance with the change of car speed.



(cont'd)

# System Description

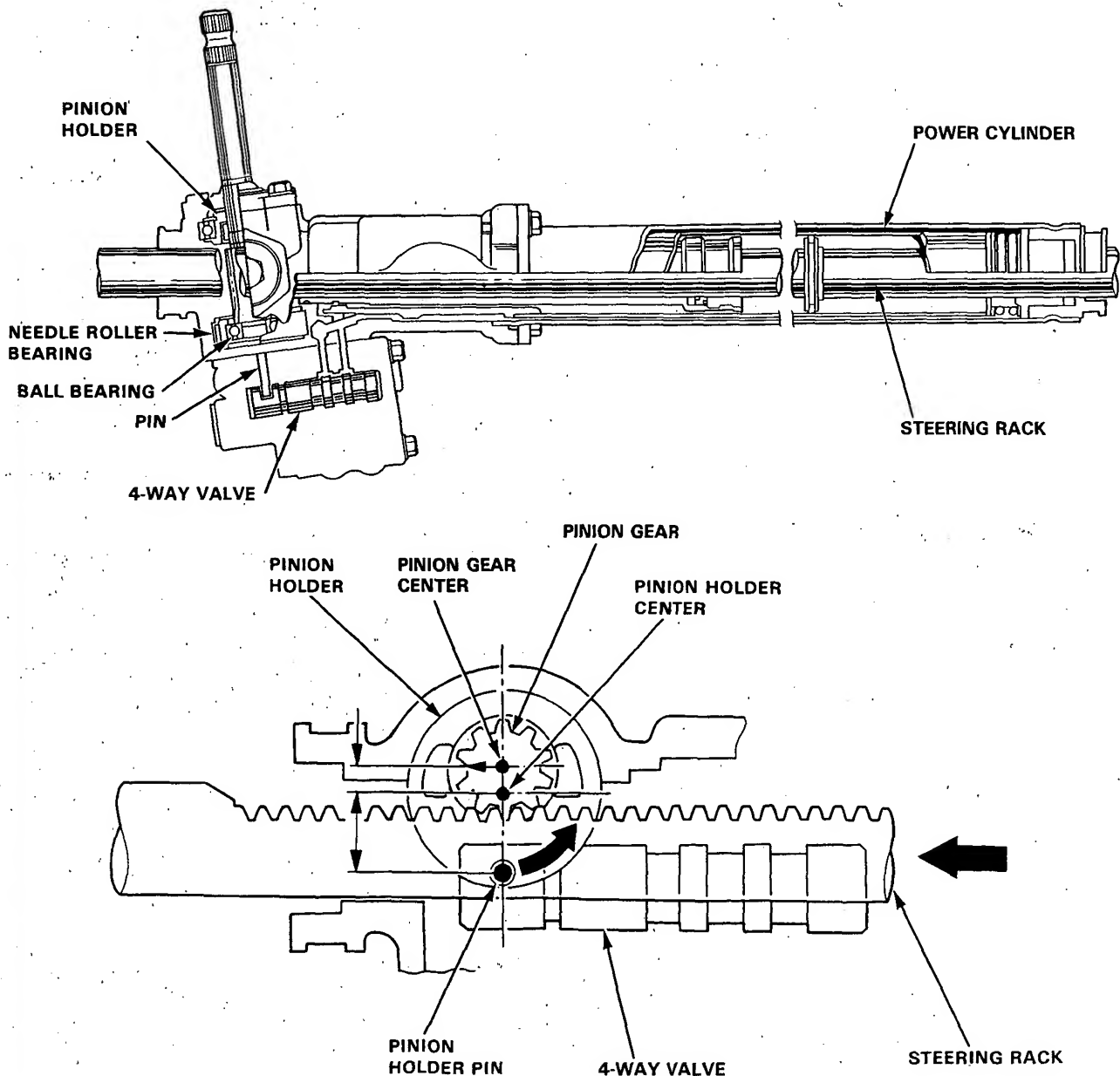
## 4-Way Valve (cont'd)

In the power steering unit, the method used to direct a single source of fluid pressure in either of two directions (for left or right turns) involves the pinion gear transferring a "message" of direction to the fluid in the 4-way valve.

The pinion is mounted slightly off-center in a pair of bearings, which are in turn mounted in a pinion holder cylinder that rotates, centered in its own outer bearings. At the bottom of the pinion holder is a pin, which fits in a slot in the 4-way valve.

As the pinion is turned (to turn left or right), because it is off-center, it also moves slightly along the rack. This movement is transferred to the holder. The pin in the holder then moves the 4-way valve, to direct fluid pressure to either side of the rack in the power cylinder.

The back edges of the pinion holder (facing away from the rack) hit stops cast into both sides of the gear housing to avoid pushing the 4-way valve too far in either direction. The front edge of the pinion holder cuts off assist at full lock as described on the next page.

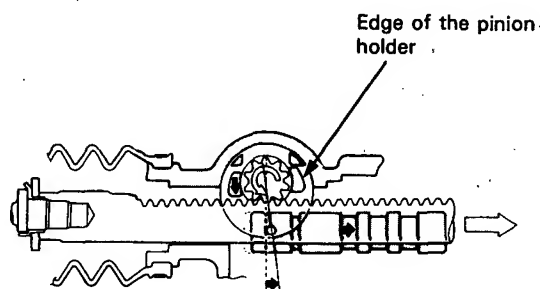




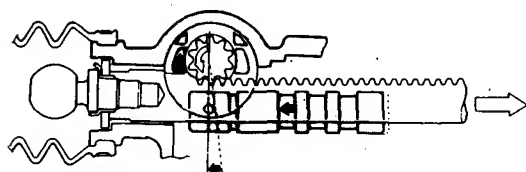
## Full-Lock Unloader System

The 4-way valve shifts the direction of fluid flow when the steering wheel is turned, right or left. However, when the wheel is turned to the right or left lock at parking speed, the edge of the pinion holder rides up on the end of the rack, moving the pin in the opposite direction which pulls the 4-way valve back to neutral.

This keeps pump pressure from building up (which could cause idle speed to drop), and improves steering feel by increasing resistance at left and right lock.



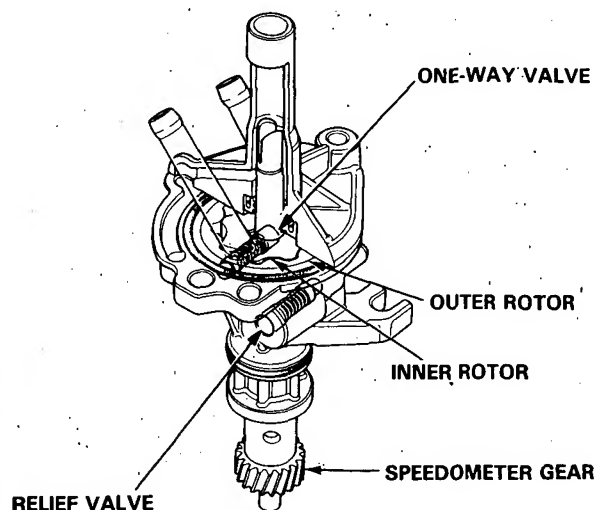
Control in "assist" position



4-Way valve moves back to "neutral" position

## Power Steering Speed Sensor

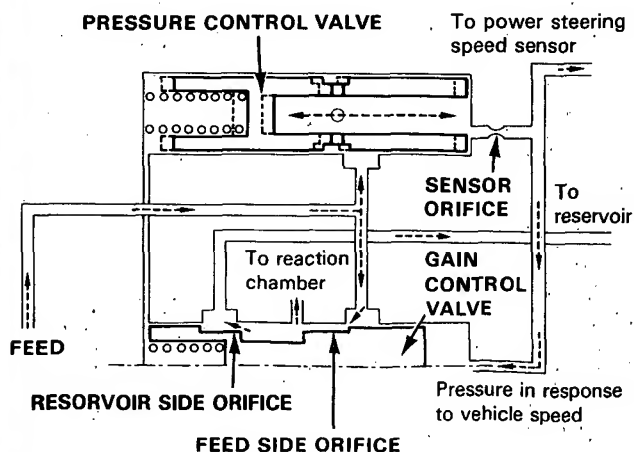
The power steering speed sensor is a trochoid-rotor, hydraulic pump combined with a relief valve and a one-way valve. It is driven by the speedometer gear shaft which in turn is driven by a helical gear on the differential.



The power steering speed sensor turns only when the car is moving, controlling the gain control valve. The constant pressure is generated by the pressure control valve.

This pressure is used as a reference pressure for the response to the car speed. By introducing this pressure to the power steering speed sensor through the sensor orifice, the pressure downstream of the orifice is changed according to the speed of car.

This pressure is then used to operate the gain control valve.



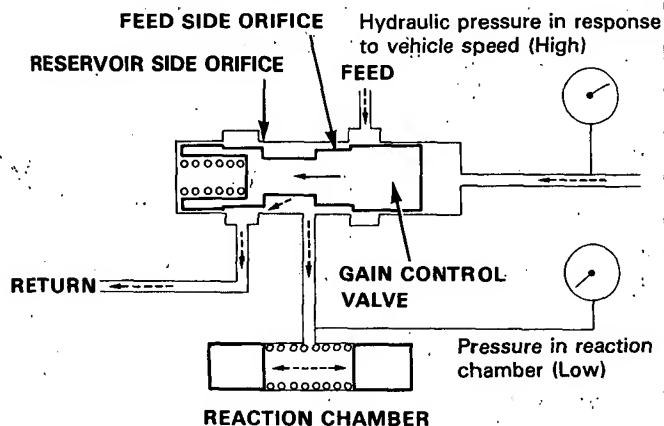
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# System Description

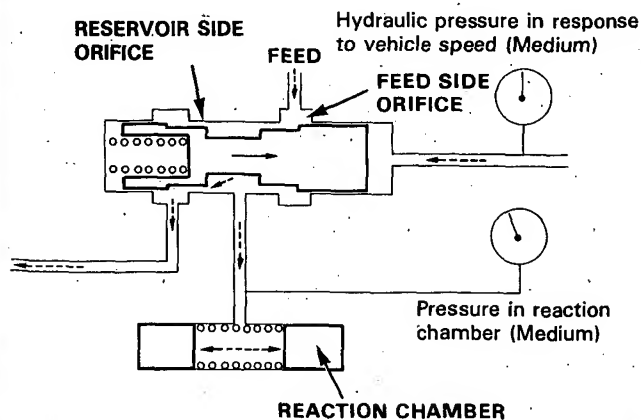
## Power Steering Speed Sensor (cont'd)

With the engine running at idle in a parked car, fluid flow through the sensor rotors is blocked because the rotors are not turning. Therefore the gain control valve moves left.

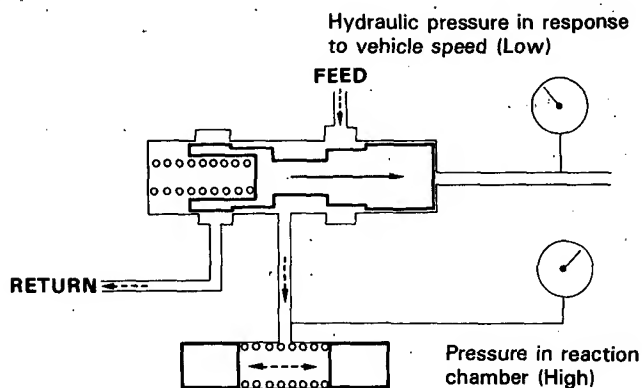
On the gain control valve, the orifice resistance is high on pump side, while it is low on the reservoir side, with the result that pressure in the reaction chamber is lowered and steering wheel operation with easily.



As the car is driven away, the rotors start turning and the fluid returns to the reservoir, reducing the fluid pressure at the gain control valve. Therefore, the gain control valve begins to move to the right. The orifice resistance on the pump and reservoir sides is appropriately balanced, with the result that the reaction chamber is in the medium range and the steering resistance is moderate.



When the car is moving at high speed, the sensor reduces the pressure further and the gain control valve moves more to the right. The orifice pressure on the pump side is low and the pressure on the reservoir side is high, the fluid pressure in the reaction chamber is also high giving the steering wheel less assist.

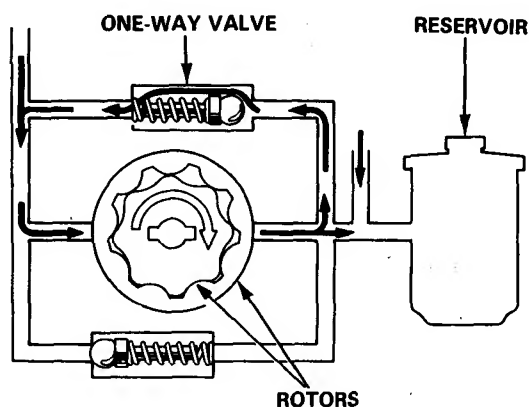




### One-way Valve (In Power Steering Speed Sensor)

When the car is moving at high speed, negative pressure develops at the sensor inlet because the power steering speed sensor is pumping faster than the fluid can be supplied. To compensate for this, the outlet and inlet ports are connected internally by a passage containing a one-way valve that lets output fluid recirculate to the inlet port to equalize pressure.

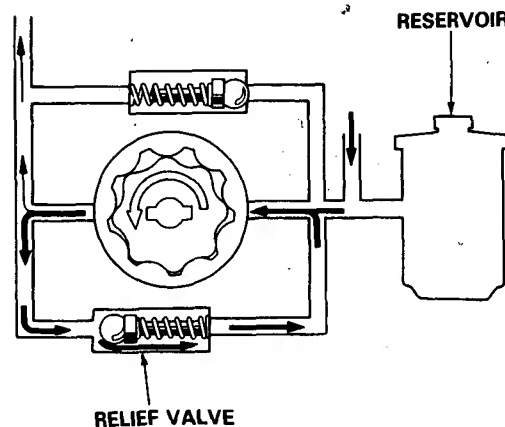
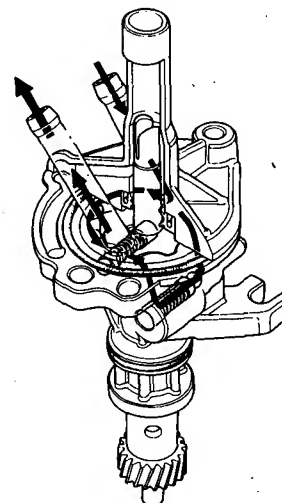
Driving at High Speed:



### Relief Valve (In Power Steering Speed Sensor)

When the car is moving in reverse, the power steering speed sensor also turns backward and pumps fluid in the opposite direction. To avoid building up pressure in the reaction chambers that would increase steering effort while driving in reverse, the inlet and outlet-ports are connected by a second internal passage containing a relief valve that allows the fluid to recirculate.

Driving in Reverse:



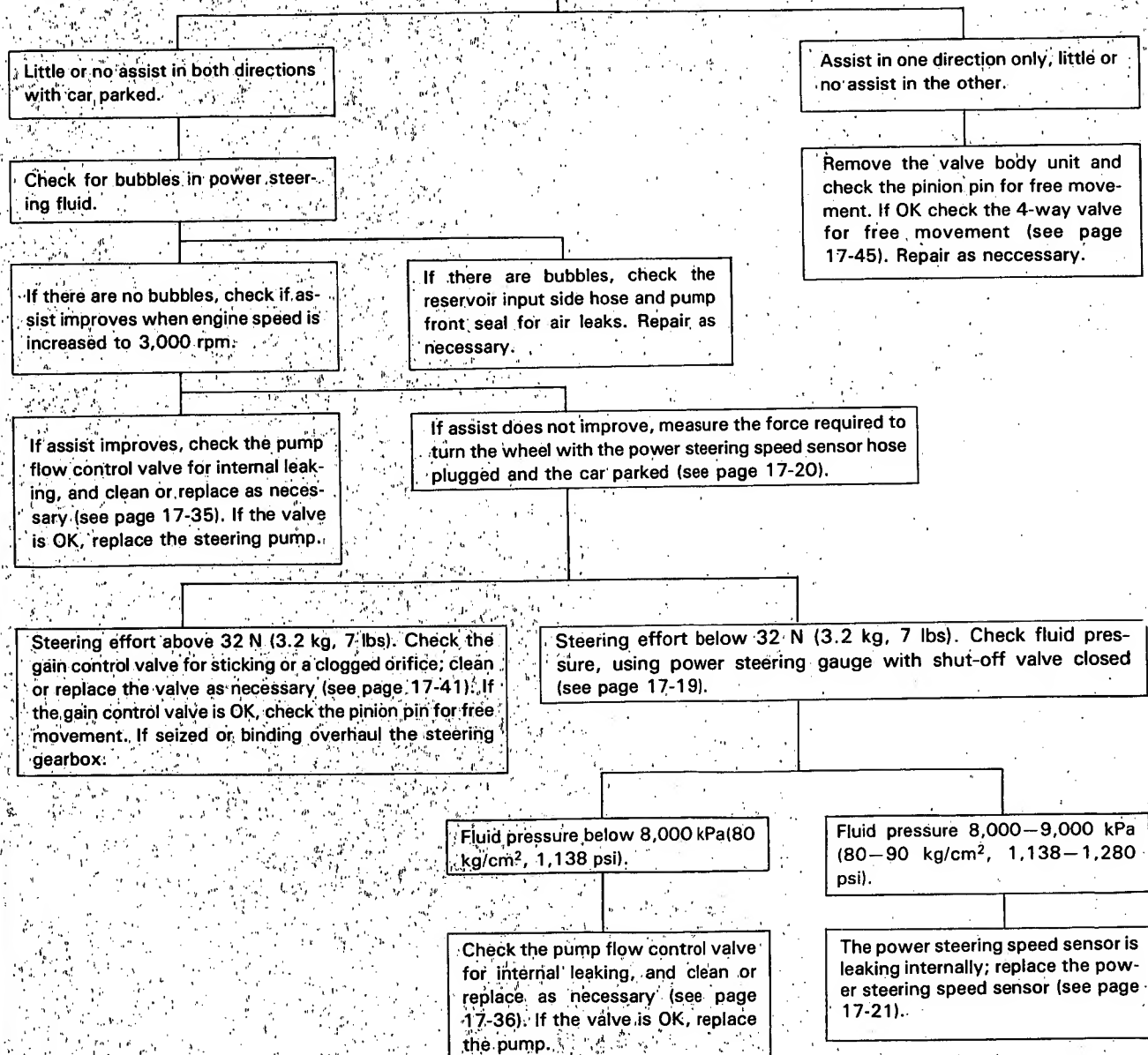
# Troubleshooting

## General Troubleshooting

Check the following before you begin:

- Has the suspension been modified in a way that would affect steering?
- Are tire sizes and air pressure correct?
- Is the steering wheel original equipment or equivalent?
- Is the power steering pump belt properly adjusted?
- Is steering fluid reservoir filled to proper level?
- Is the engine idle speed correct and steady?

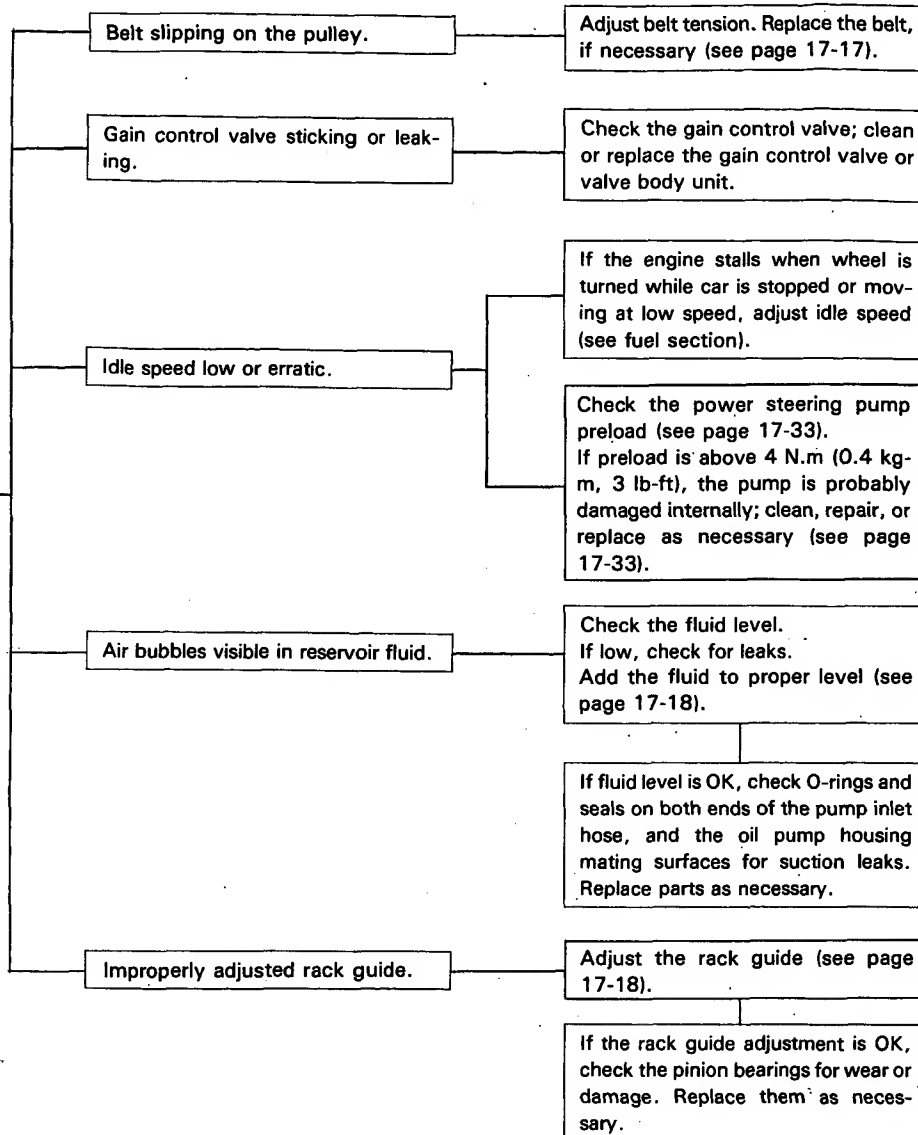
### Hard Steering







Uneven or rough steering.



(cont'd)

# Troubleshooting

## General Troubleshooting (cont'd)

Shock or vibration when wheel is turned to full lock.

Pump belt slipping on pulley (pump stops momentarily).

Adjust the belt tension (see page 17-17) or replace belt.

Install the power steering pressure gauge. Close the shut-off valve fully and measure the pump pressure (see page 17-19).

The pump pressure should be 8,000–9,000 kPa (80–90 kg/cm<sup>2</sup>, 1,138–1,280 psi) and needle fluctuation is  $\pm 500$  kPa ( $\pm 5$  kg/cm<sup>2</sup>,  $\pm 70$  psi) or less. If the needle fluctuation exceeds  $\pm 500$  kPa ( $\pm 5$  kg/cm<sup>2</sup>,  $\pm 70$  psi) check the flow control valve. If the flow control valve is OK, replace the pump.

Assist (excessively light steering) at high speed.

Measure force required to turn wheel with bypass tube joint installed, and car parked on dry paved surface (see page 17-21).

If below 50 N (5.0 kg, 11 lbs), check gain control/pressure control valves and valve body unit and replace parts as necessary.

Steering kicks back during wide turns.

Pump belt slipping.

Adjust the belt tension (see page 17-17) or replace belt.

Sticking gain control valve or valve body unit.

Replace gain valve or valve body unit.

Rack guide adjusted too loose.

Adjust the rack guide (see page 17-18).

Wheel will not return smoothly.

Tire pressure too low.

Inflate to correct pressure.

Improper front wheel alignment.

Readjust the front wheel alignment or replace parts as necessary.

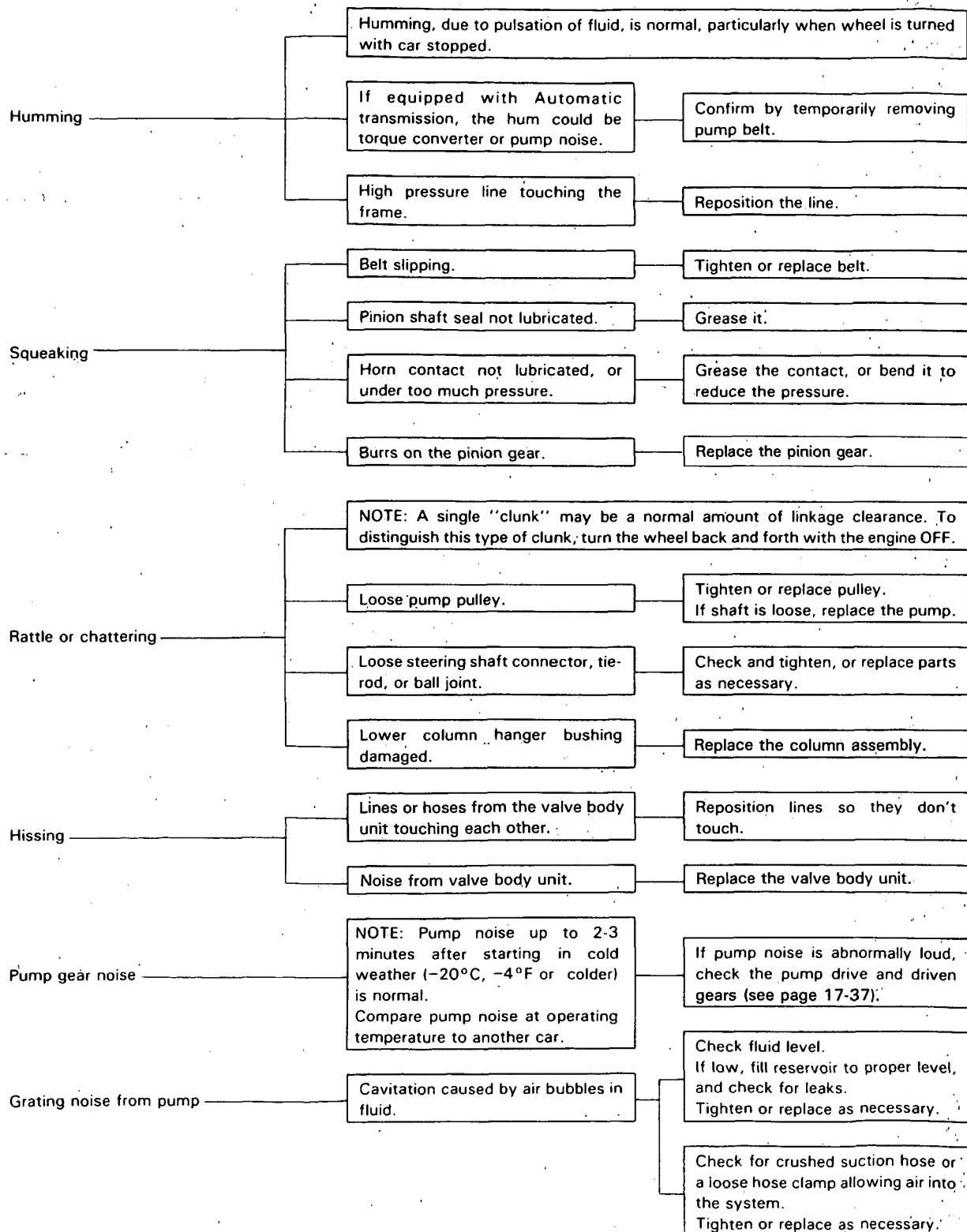
Improperly adjusted rack guide.

Adjust the rack guide (see page 17-18).



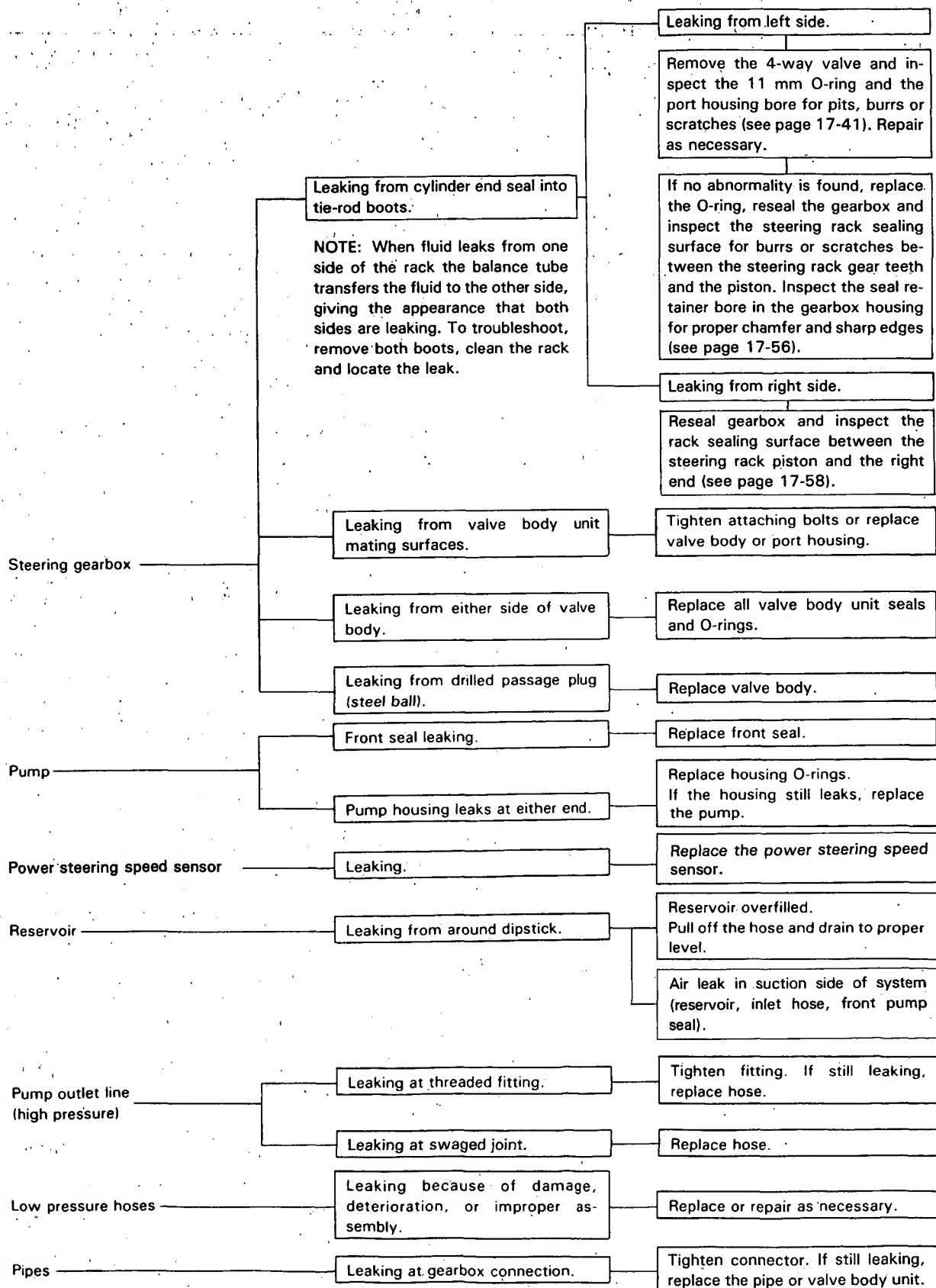
## Noise and Vibration

NOTE: Pump noise in first 2–3 minutes after starting in cold weather ( $-20^{\circ}\text{C}$ ,  $-4^{\circ}\text{F}$  or colder) is normal.



# Troubleshooting

## Fluid Leaks



# Maintenance



## Pump Belt Adjustment

**NOTE:** When using a new belt, first adjust the deflection or tension to the values for a new belt, run the engine for five minutes and readjust the deflection or tension to the values for a used belt.

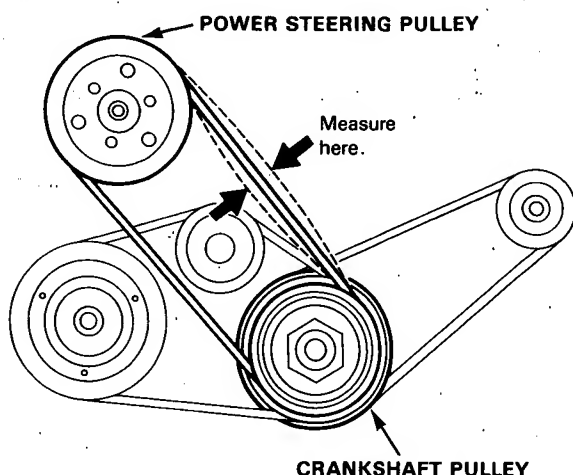
1. Apply a force of 100 N (10 kg, 22 lbs) and measure the deflection between the power steering pump and the crankshaft pulleys.

**Deflection:**

**Used belt:** 9.5–11.5 mm (0.37–0.45 in)

**New belt:** 6.0–8.0 mm (0.24–0.32 in)

**NOTE:** If there are cracks or any damage evident on the belt, replace it with a new one.



**Measure with Belt Tension Gauge Set:**

Attach the belt tension gauge to the belt and measure the tension of the belt.

**Tension:**

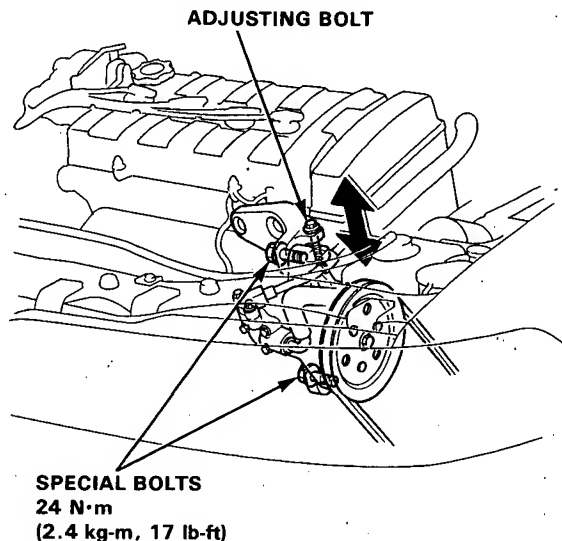
**Used belt:** 350–450 N (35–45 kg, 77–99 lbs)

**New belt:** 680–800 N (68–80 kg, 150–176 lbs)

**NOTE:**

- If there are cracks or any damage evident on the belt, replace it with a new one.
- Follow the manufacturer's instructions for the tension gauge.

2. Loosen the special bolts and turn the adjusting bolt to get proper tension, then retighten the special bolts.



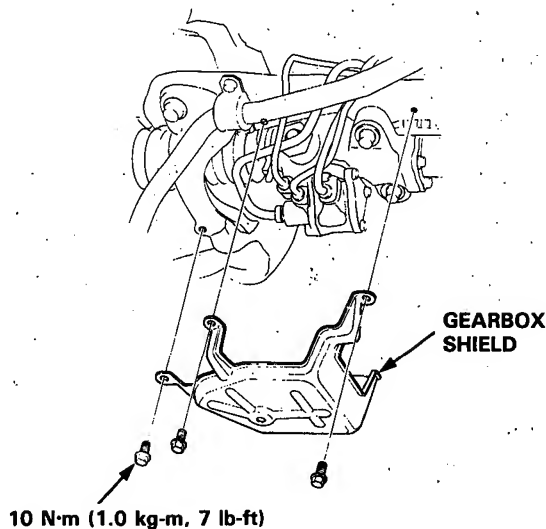
3. Start the engine and turn the steering wheel from lock-to-lock several times; then recheck the belt tension.

# On-Car Checks

## Rack Guide Adjustment

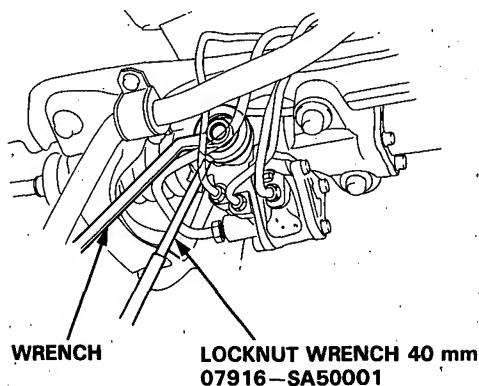
NOTE: Perform rack guide adjustment with the wheels in the straight ahead position.

1. Remove the gearbox shield.



2. Loosen the locknut on the rack guide screw with the special tool as shown.

**CAUTION:** When servicing, be careful not to damage power steering fluid lines with the special tool.



3. Tighten the guide screw until it compresses the spring and seats against the guide, then loosen it. Retighten it to about: 4 N·m (0.4 kg-m, 3 lb-ft) Then back it off about:  $20^{\circ} \pm 5^{\circ}$  Tighten the locknut to about 25 N·m (2.5 kg-m, 18 lb-ft) while preventing the guide screw from turning.
4. Check the steering effort as described.

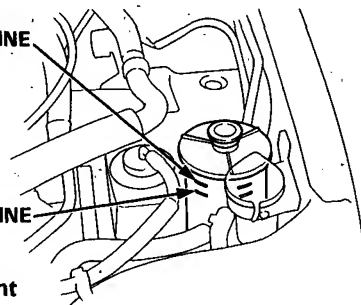
## Fluid Replacement

### Fluid Level Inspection

Check the power steering fluid level with the engine cold and the car parked on level ground. Make sure the fluid level is between the UPPER and LOWER level lines on the reservoir. If the level is near or below the lower level lines, check the system for leaks. If the system is not leaking and the fluid level is low, add fluid to the upper level line.

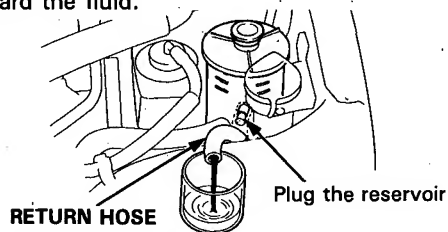
UPPER LEVEL LINE

LOWER LEVEL LINE



### Fluid Replacement

1. Disconnect the return hose from the gearbox at the reservoir, and put the end in a suitable container.
2. Start the engine, let it run at idle, and turn the steering wheel from lock-to-lock several times. When fluid stops running out of the hose, shut off the engine. Discard the fluid.



3. Refit the return hose on the reservoir.
4. Fill the reservoir to the upper level line.

NOTE: Take care not to spill the fluid on the body and parts. Wipe off the spilled fluid at once.

**CAUTION:** Use only Honda Power Steering Fluid-V. Using other fluids such as ATF or other manufacturer's power steering fluid will damage the system.

**SYSTEM CAPACITY:** 1.4 liter (1.5 US qt., 1.2 Imp qt.)

**RESERVOIR CAPACITY:** 0.5 liter (0.5 US qt., 0.4 Imp qt.)

5. Start the engine and run it at idle, then turn the steering from lock-to-lock several times to bleed air from the system.
6. Recheck the fluid level and add some if necessary.

**CAUTION:** Do not fill the reservoir beyond the upper level line.

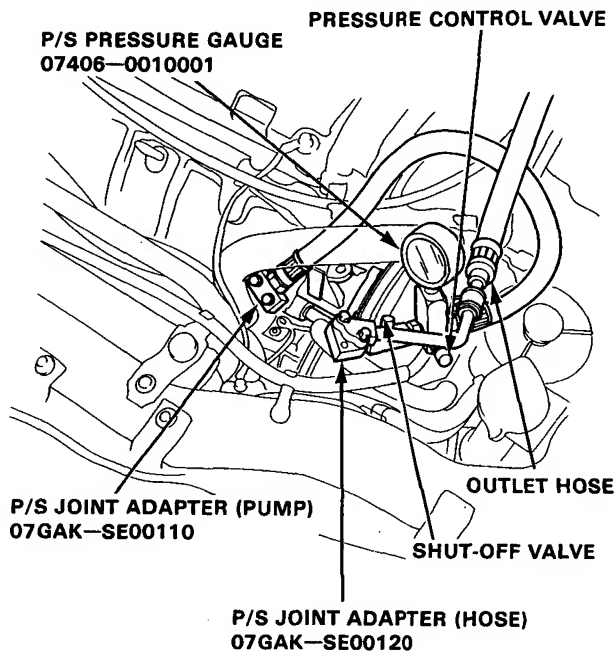


## Pump Pressure Check

Check the fluid pressure as follows to determine whether the trouble is in the pump or gearbox.

**NOTE:** First check the power steering fluid level and pump belt tension.

1. Disconnect the outlet hose from the pump outlet fitting, and install the pump joint adaptor on the outlet.
2. Install the hose joint adaptor to the outlet hose.
3. Install the power steering pressure gauge between the pump and hose joint adaptors as shown.

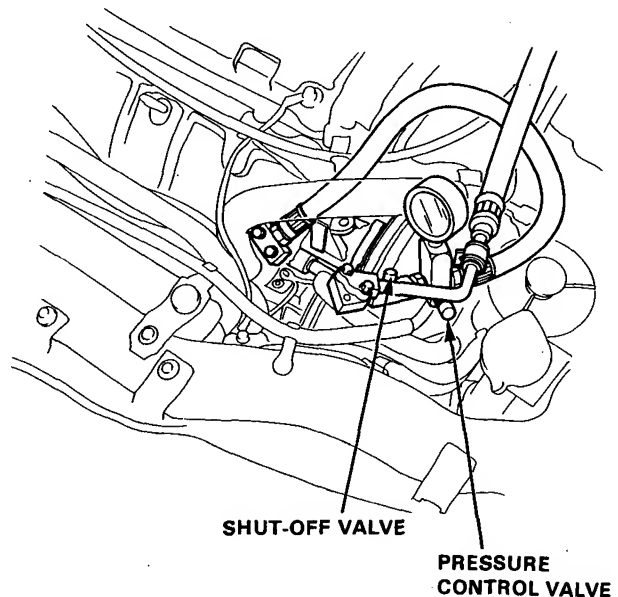


4. Open the shut-off valve fully.
5. Open the pressure control valve fully.

6. Start the engine and let it idle.
7. Turn the steering wheel from lock-to-lock several times to warm the fluid to operating temperature.
8. Close the shut-off valve, then, close the pressure control valve gradually until the pressure gauge needle is stable. Read the pressure.
9. Immediately open the shut-off valve fully.

**CAUTION:** Do not keep the shut-off valve closed more than 5 seconds or the pump could be damaged by over-heating.

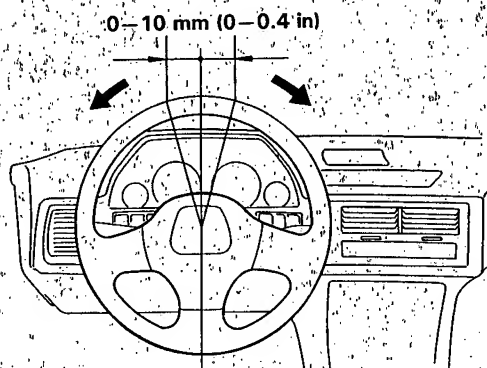
If the pump is in good condition, the gauge should read at least 8,000–9,000 kPa (80–90 kg/cm<sup>2</sup>, 1,138–1,280 psi). A low reading means pump output is too low for full assist. Repair or replace the pump.



## On-Car Checks

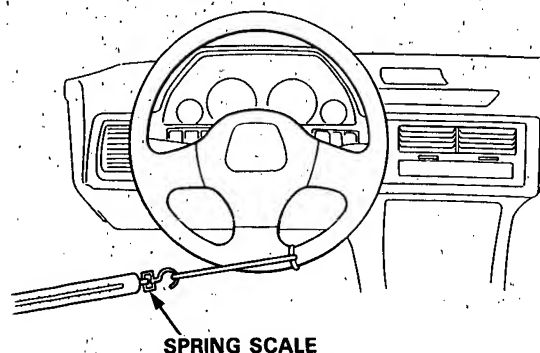
### Steering Wheel Rotational Play

1. Place the front wheels in a straight-ahead position and measure the distance the steering wheel can be turned without moving the front wheels.
2. If the play exceeds the service limit, check all steering components.

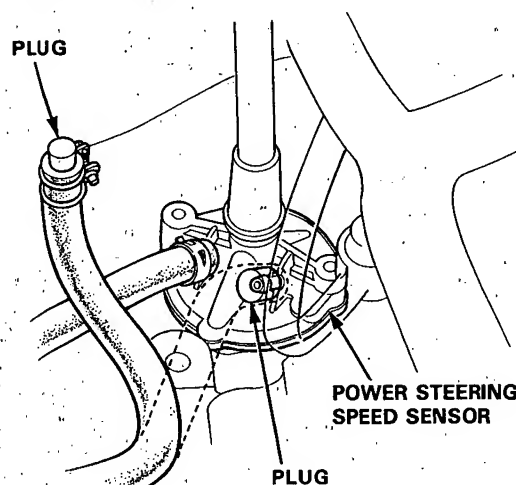


### Power Assist Check with Car Parked

1. Check the power steering fluid level and pump belt tension.
2. Start the engine, allow it to idle, and turn the steering wheel from lock-to-lock several times to warm up the fluid.
3. Attach a spring scale to the steering wheel. With the engine idling and the car on a clean, dry floor, pull the scale as shown and read it as soon as the tires begin to turn.



4. The scale should read no more than 32 N (3.2 kg, 7 lbs). If it reads more or less, go on step 5.
5. Stop the engine. Disconnect the hose from the power steering speed sensor and plug the hose and the sensor fitting as shown.



6. Start the engine and let it idle.
  - If the reading is now 32 N (3.2 kg, 7 lbs) or less, replace the power steering speed sensor (see page 17-21).
  - If the reading is still more than 32 N (3.2 kg, 7 lbs), check the gearbox and pump.

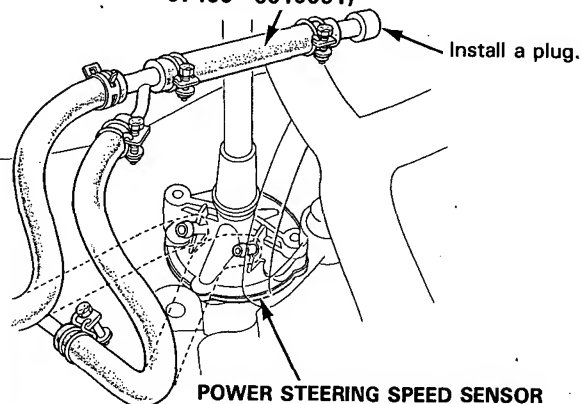




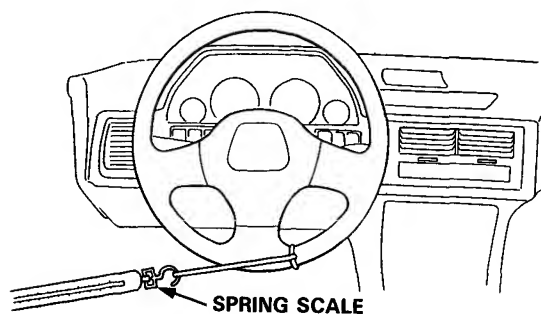
## Assist Check

1. Check the power steering fluid level and pump belt tension.
2. Start the engine, let it warm up to normal operating temperature (the cooling fan comes on), and turn the steering wheel lock-to-lock a few times to warm up the fluid.
3. Stop the engine. To simulate speeds above 30 mph (50 km/h) disconnect the hoses from the power steering speed sensor and connect them to the bypass tube joint. Plug the end of the bypass tube joint.

**BYPASS TUBE JOINT**  
07406-0010101  
(Included with  
07406-0010001)



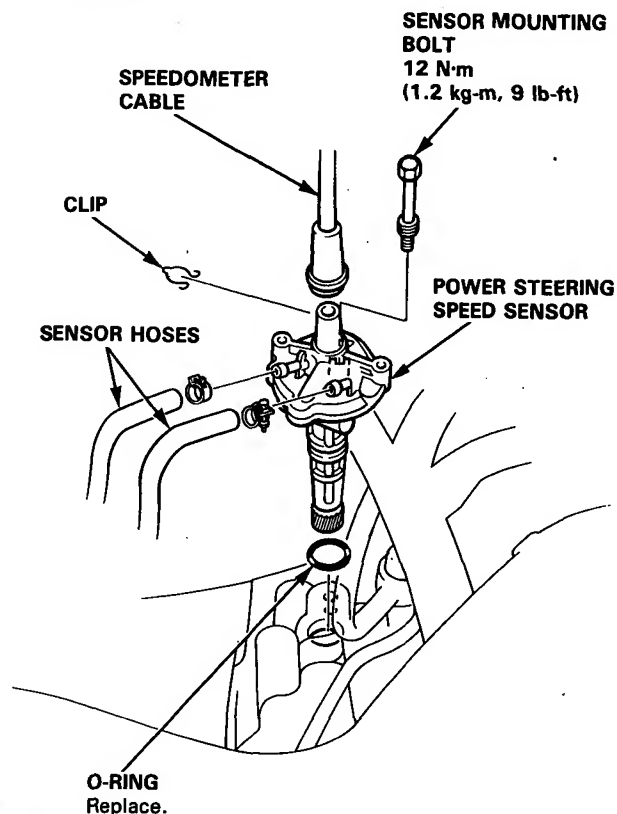
4. Attach the spring scale to the steering wheel. With the engine idling and the car on a clean, dry floor, pull the scale as shown and read it as soon as the tires begin to turn.



- If the scale reads a normal 50 N (5.0 kg, 11 lbs), or more, the assist at high speeds is being caused by reduced power steering speed sensor output. Replace the power steering speed sensor.
- If the scale reads less than 50 N (5.0 kg, 11 lbs), the power steering speed sensor is OK, and the problem is in the sensor feed line, the pump, or the valve body unit. See if the feed line is pinched or bent then check pump.
- See General Troubleshooting (see page 17-12).

## Power Steering Speed Sensor Replacement

1. Remove the sensor mounting bolt and pull the power steering speed sensor from the transmission housing.

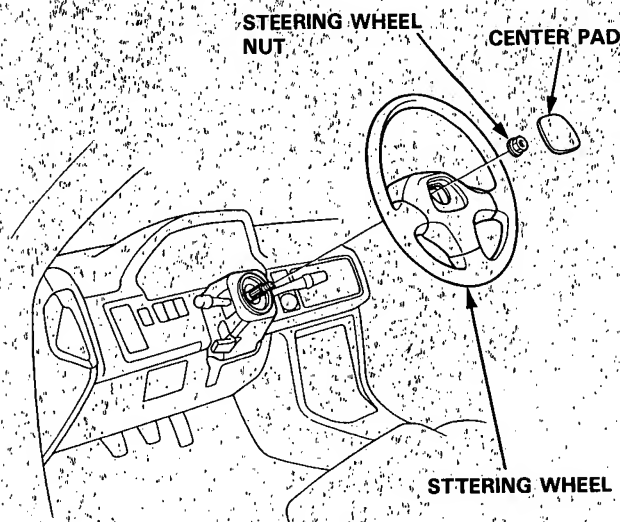


2. Pull up the speedometer cable boot, remove the clip, and pull out the speedometer cable.
3. Disconnect the sensor hoses and plug the fittings.
4. After installing a new power steering speed sensor, turn the steering wheel lock-to-lock with the engine idling to bleed air from the system.
5. Check the reservoir and add fluid if necessary.

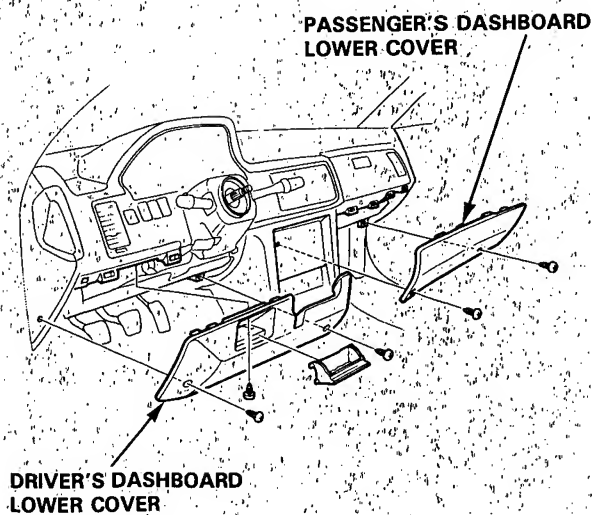
# Column

## Removal

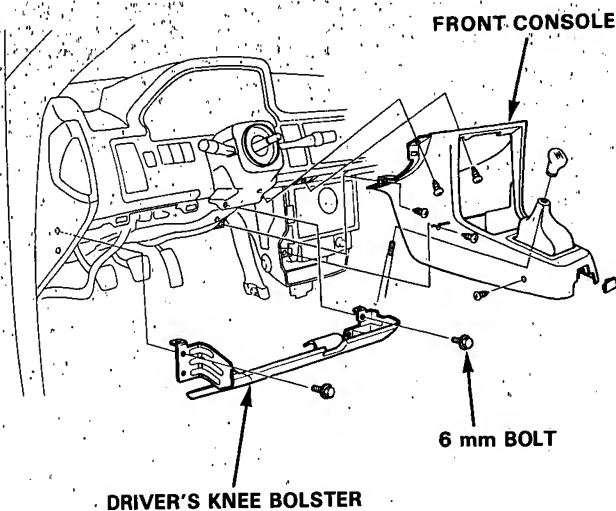
1. Remove the center pad.
2. Remove the steering wheel nut.
3. Remove the steering wheel by rocking it slightly from side-to-side as you pull steadily with both hands.



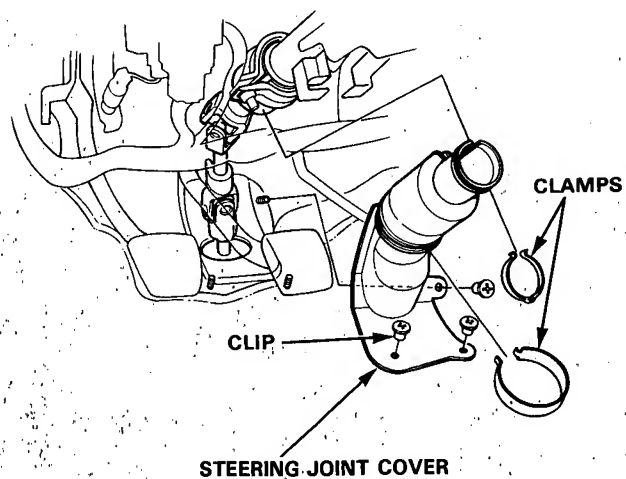
4. Remove the dashboard lower covers.



5. Remove the front console.
6. Remove the driver's knee bolster from the steering hanger.

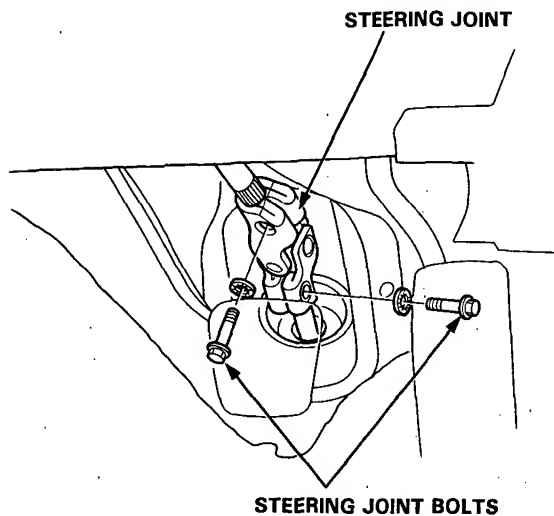


7. Remove the steering joint cover.

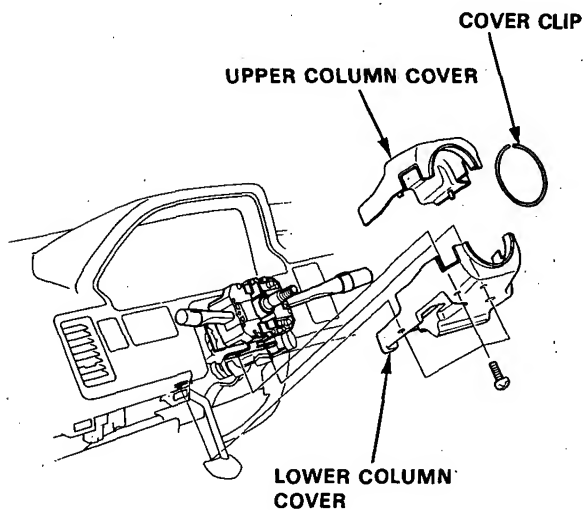




8. Remove the steering joint bolts, and move the joint toward the column.

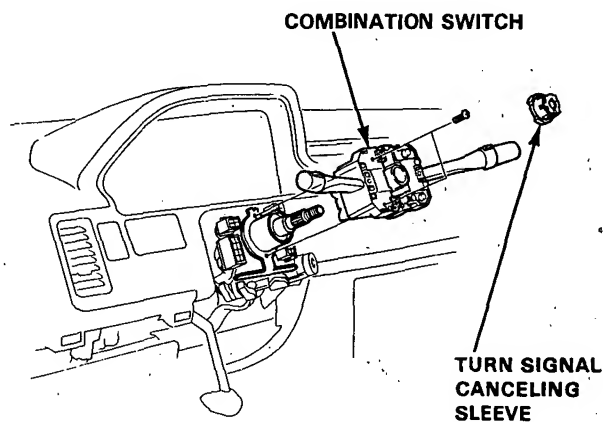


9. Remove the cover clip and column covers.

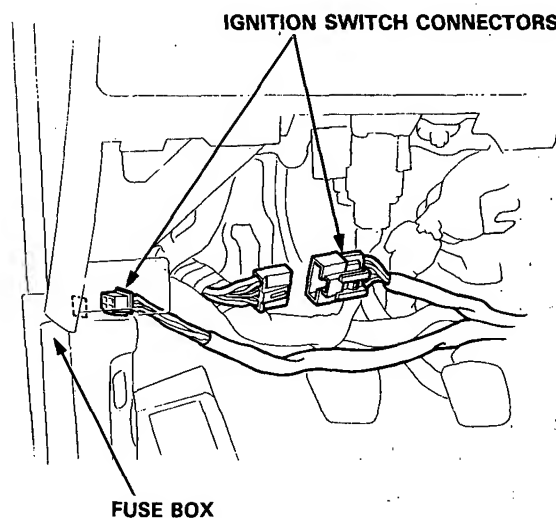


10. Disconnect the connectors from the combination switch.

11. Remove the turn signal canceling sleeve and combination switch.



12. Disconnect the ignition switch connectors from the fuse box under the left side of the dash.



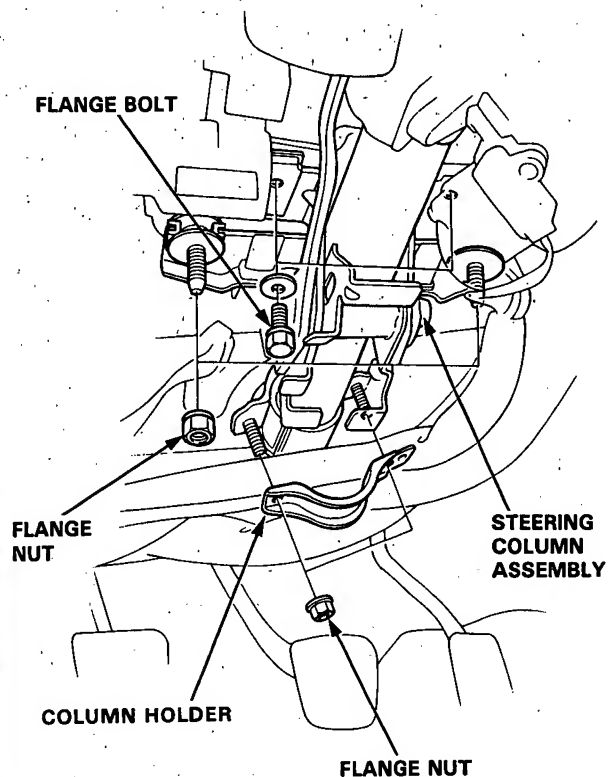
(cont'd)

# Column

## Removal (cont'd)

13. Remove the column holder.

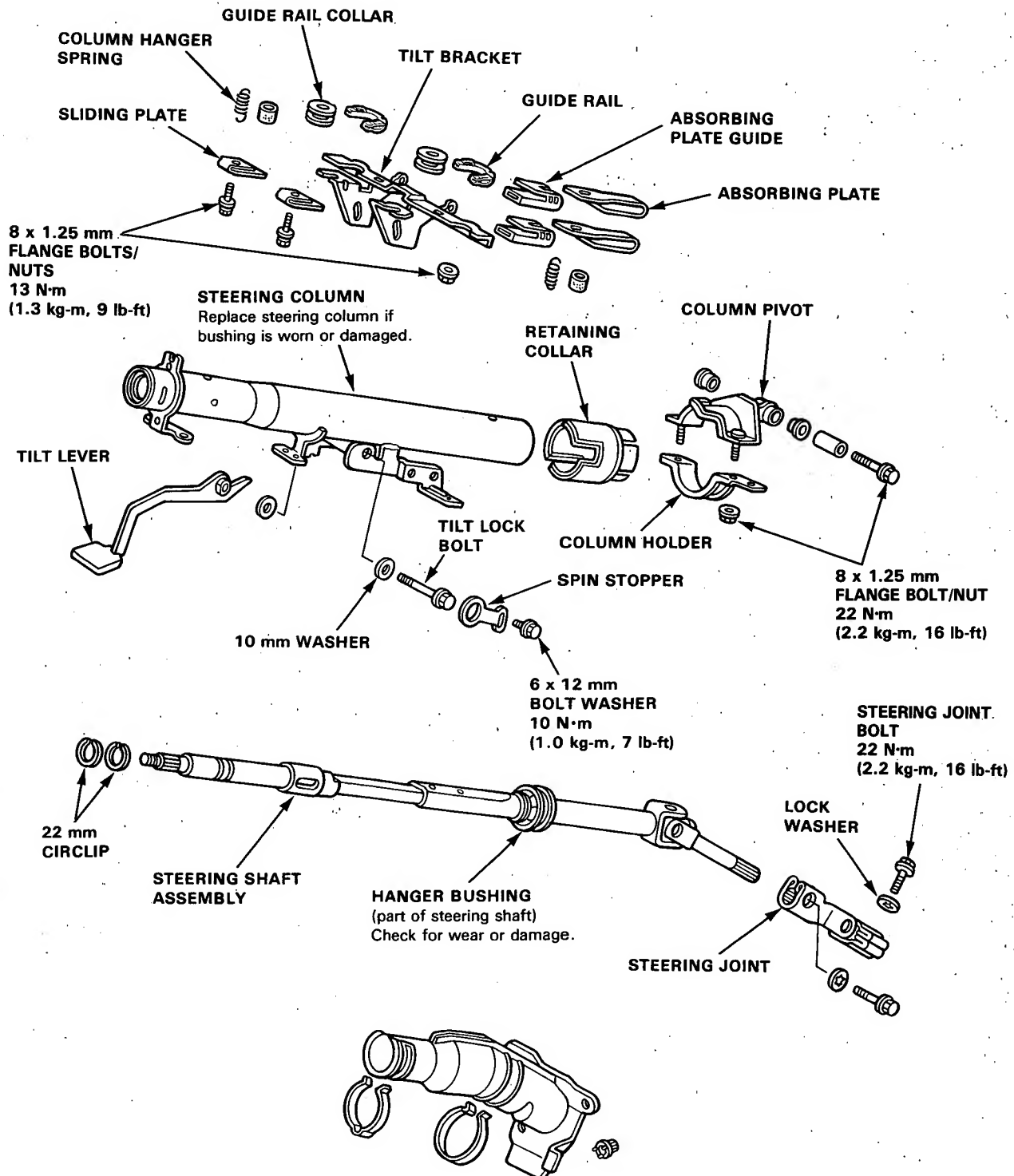
14. Remove the attaching nuts and bolts; then remove the steering column assembly.





## Disassembly/Inspection

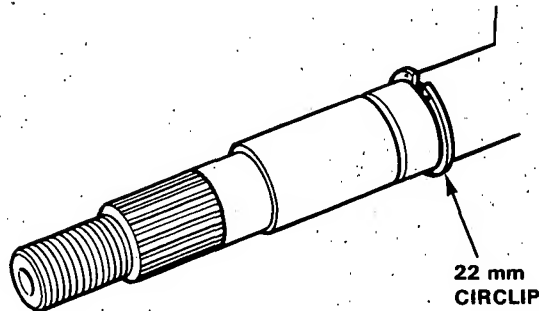
1. Remove the spin stopper by removing the 6 x 12 mm bolt washer.
2. Remove the tilt lock bolt, tilt spring, tilt lever, tilt bracket, 10 mm washer and column hanger spring.
3. Position the ignition switch in "I".
4. Remove the 22 mm circlip then remove the steering shaft assembly from bottom of the column.
5. Remove the retaining collar.



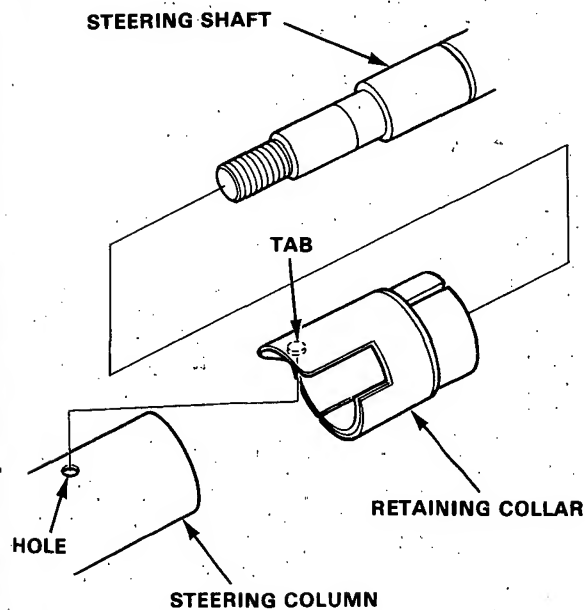
# Column

## Reassembly

1. Install the circlip on the steering shaft.



2. Install the retaining collar on the steering column aligning the hole in the column with tab on the retaining collar.

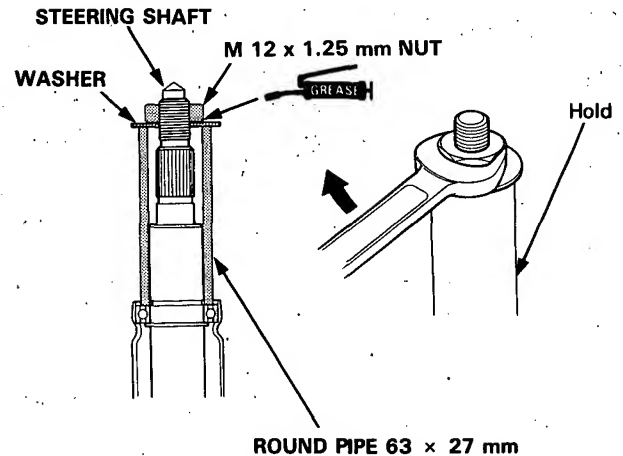


3. Carefully install the steering shaft into the column from the bottom.

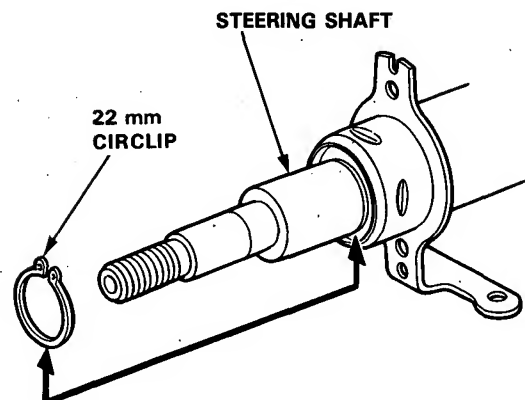
4. Install the a piece of round pipe on the steering shaft as shown below.

5. Hold the round pipe, washer and thread a M 12 x 1.25 mm nut on the steering shaft to pull the shaft into the steering column.

**CAUTION:** Do not use the steering wheel locknut.



6. Remove the round pipe and nut.
7. Install the circlip on the steering shaft.



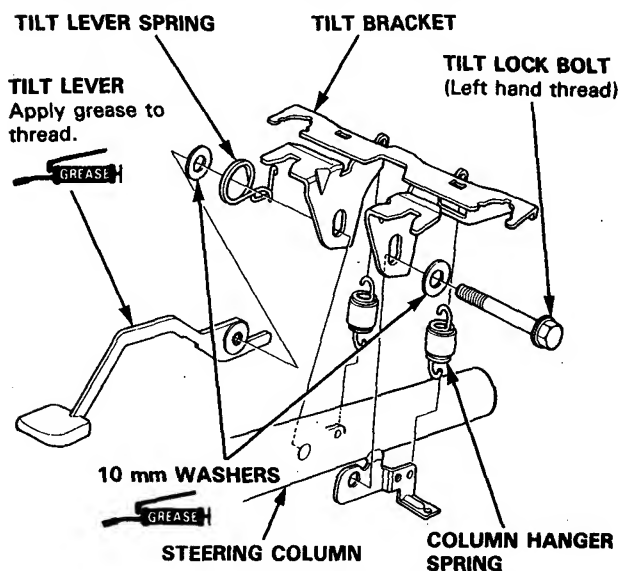


8. Loosely install the tilt lever, tilt lever spring, 10 mm washers and tilt bracket with the tilt lock bolt.

**NOTE:** Apply grease to the tilt lever threads and 10 mm washers.

9. Install the column hanger spring between the tilt bracket and steering column.

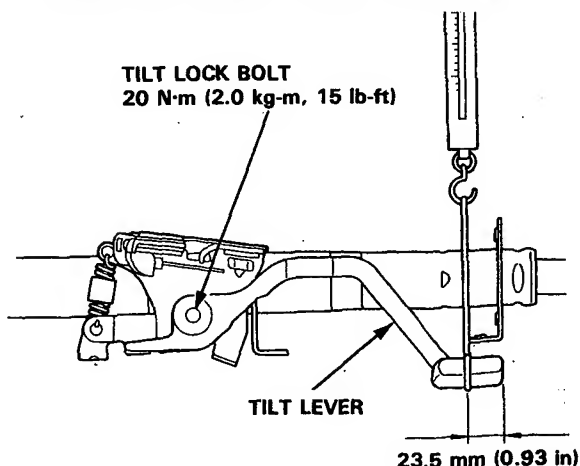
**NOTE:** The tilt lock bolt has a left hand thread.



10. Pull up the tilt lever and torque the tilt lock bolt to 20 N·m (2.0 kg-m, 15 lb-ft).

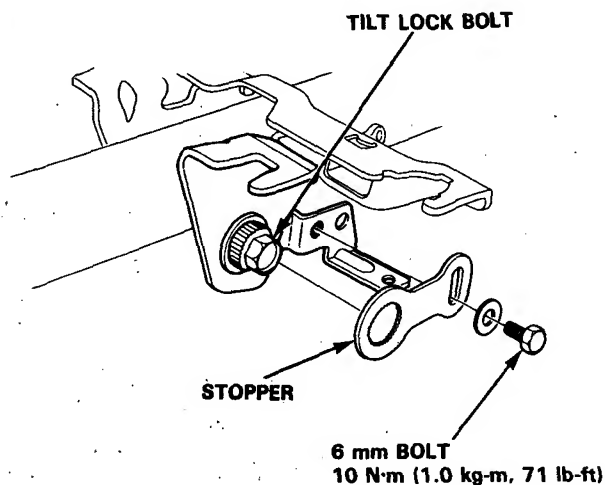
11. Attach a spring scale 23.5 mm (0.93 in) from the end of lever. Measure the force required to move the lever.

**Preload:** 70–90 N (7–9 kg, 15–20 lbs)



**NOTE:** If the preload measured is not within the specification, readjust the preload by loosening or tightening the tilt lock bolt.

12. Position the stopper on the splined portion of the tilt lock bolt and loosely install the 6 x 12 mm bolt with washer to secure tilt lock bolt.



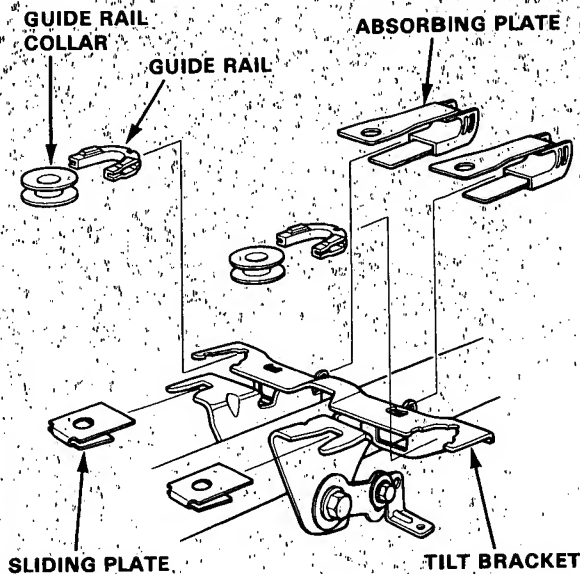
(cont'd)

# Column

## Reassembly (cont'd)

13. Install the guide rail collars in the guide rails.

14. Install the guide rails, absorbing plates and sliding plates on the tilt bracket as shown.



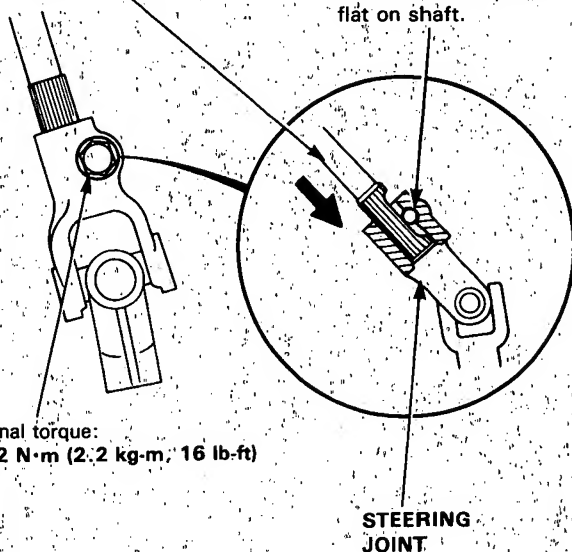
15. Slip the upper end of the steering joint onto the steering shaft (line up the bolt hole with the groove around the shaft) and loosely install the steering joint bolt.

### STEERING SHAFT

Pull down while tightening bolt.

### STEERING JOINT BOLT

Bolt must line up with flat on shaft.



Final torque:  
22 N·m (2.2 kg-m, 16 lb-ft)

## Installation

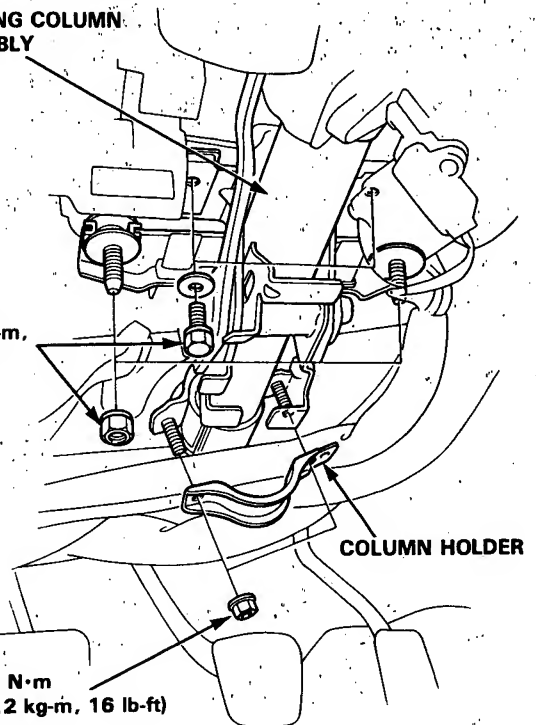
1. Slip the lower end of the steering joint onto the steering gearbox pinion shaft.

2. Install the steering column assembly with the flange nuts, bolts and column holder.

### STEERING COLUMN ASSEMBLY

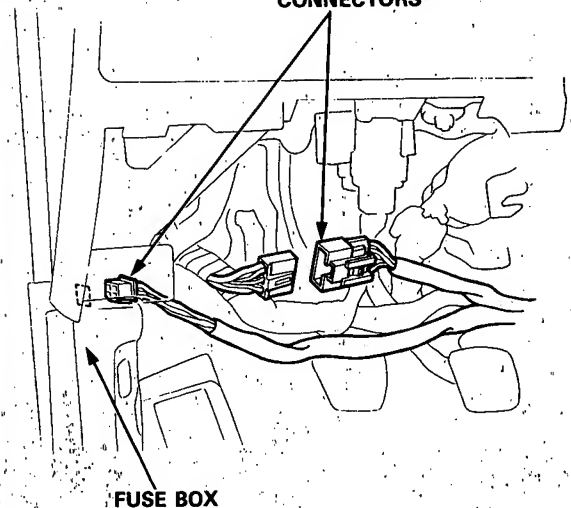
13 N·m  
(1.3 kg-m,  
9 lb-ft)

22 N·m  
(2.2 kg-m, 16 lb-ft)



3. Connect the ignition switch connectors to the fuse box under the left side of the dash.

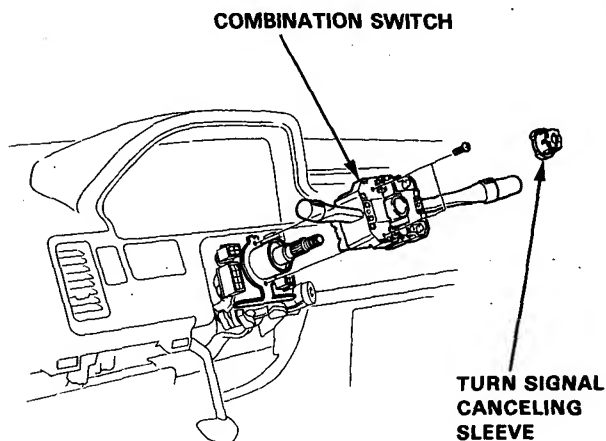
### IGNITION SWITCH CONNECTORS





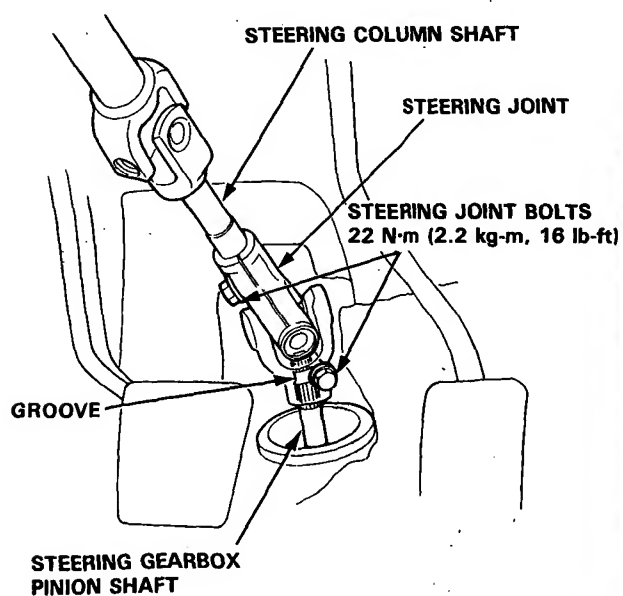


4. Install the combination switch and turn signal cancelling sleeve.
5. Connect the connectors to the combination switch.

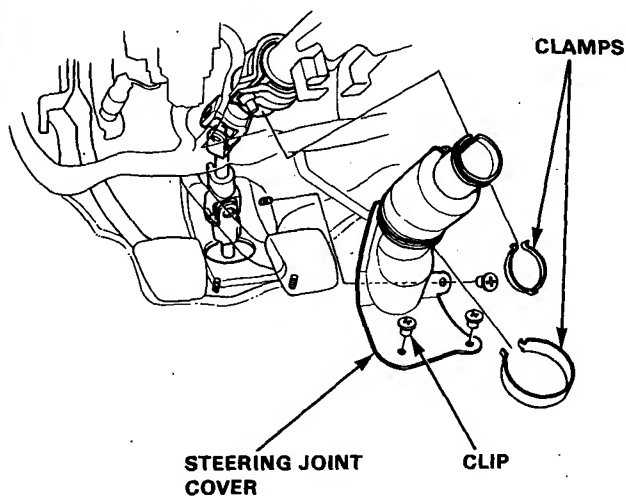


6. Install the steering joint bolts and tighten them.

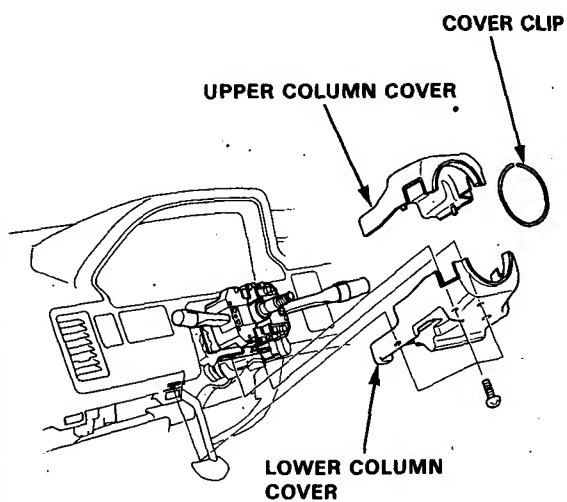
NOTE: Be sure that the steering joint bolt is securely in the groove in the steering gearbox pinion shaft.



7. Install the steering joint cover with the clamps and clips.



8. Install the column covers, and cover clip.



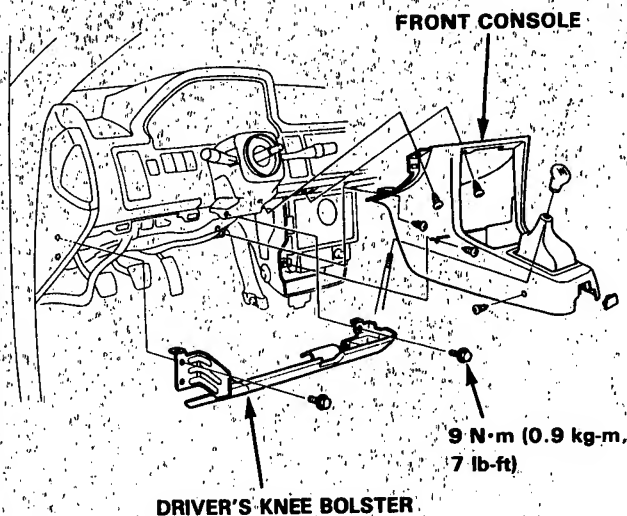
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# Column

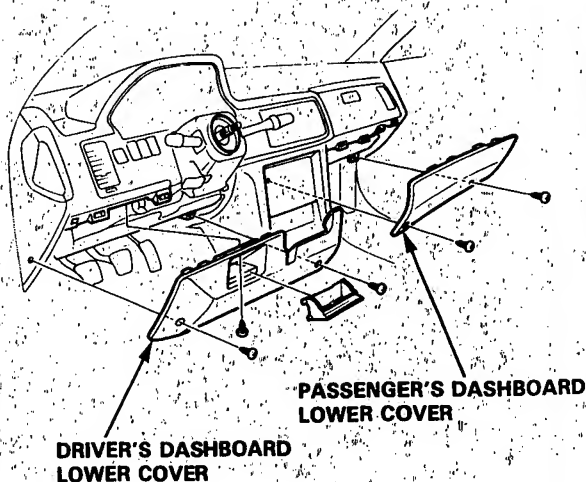
## Installation (cont'd)

9. Install the driver's knee bolster on the steering hanger.

10. Install the front console.



11. Install the dashboard lower covers.

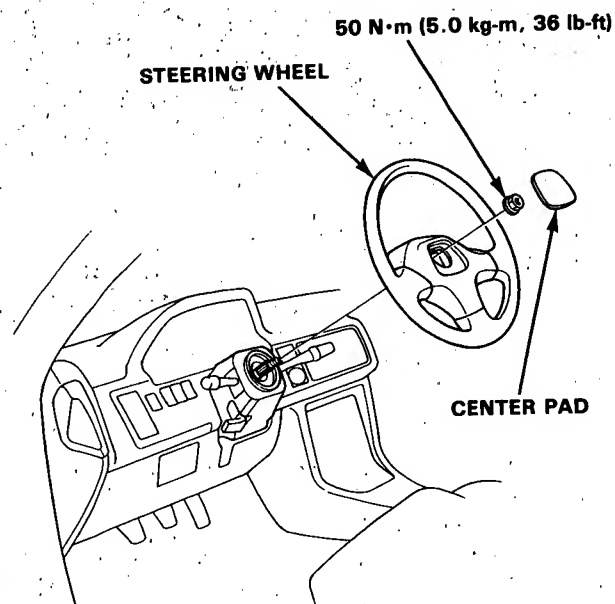


12. Install the steering wheel in a straight ahead position.

**NOTE:** Align the slots on the steering wheel and tabs on the turn signal canceling sleeve.

13. Tighten the steering wheel nut and torque to 50 N·m (5.0 kg-m, 36 lb-ft).

14. Check that the horn works properly, then install the center pad.

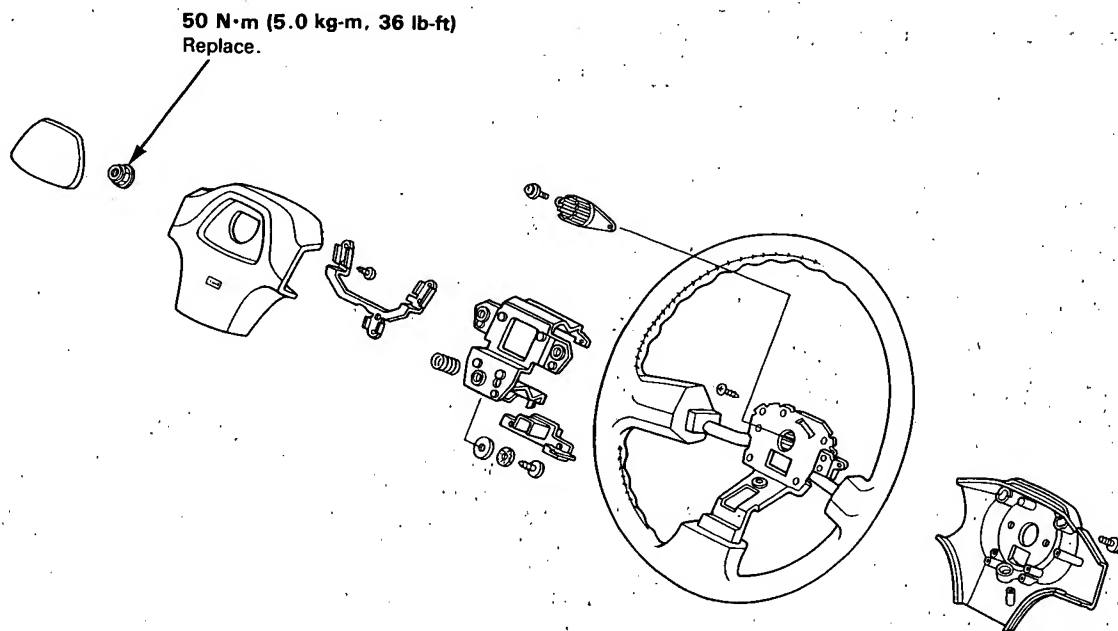




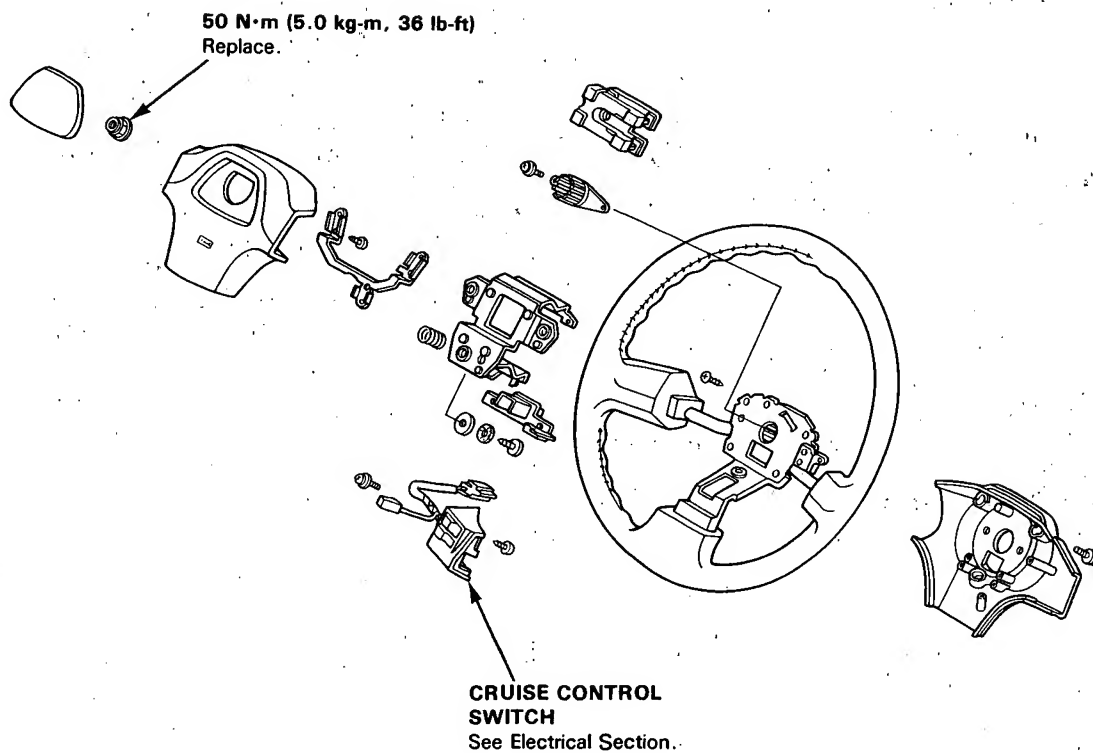
# Steering Wheel

## Disassembly/Reassembly

Without Cruise Control:



With Cruise Control:

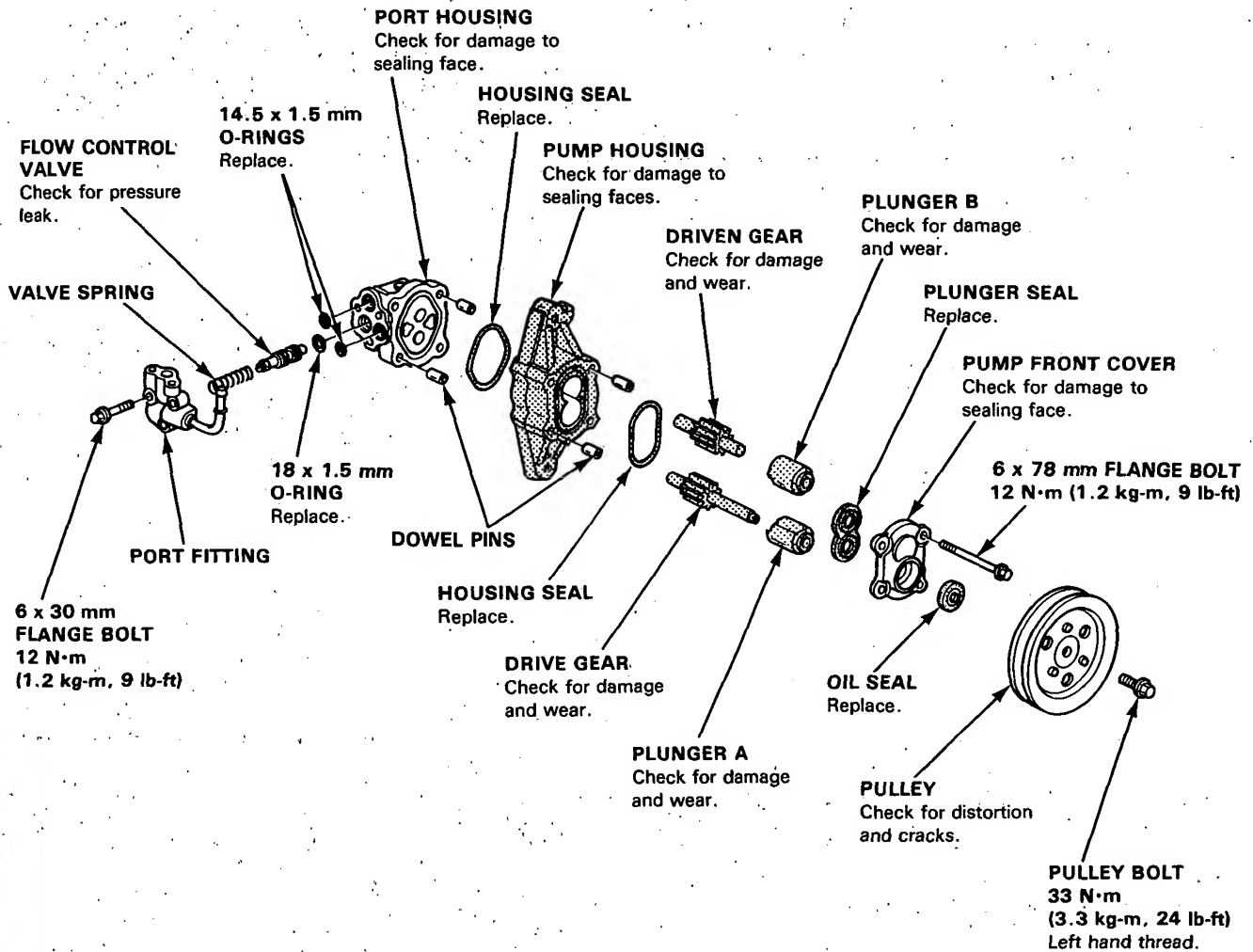


# Steering Pump

## Illustrated Index

**CAUTION:** Pump components are made of aluminum. Be careful not to damage them when servicing.

- Clean all of the disassembled parts thoroughly.
- Replace all O-rings and seals. Do not dip new O-rings and seals in solvent; coat O-rings with power steering fluid before installation, and make sure they stay in place during reassembly.
- The shaded parts are selectively fitted, and should not be disassembled except to replace seals. If any one of them is faulty, replace the whole pump as an assembly.





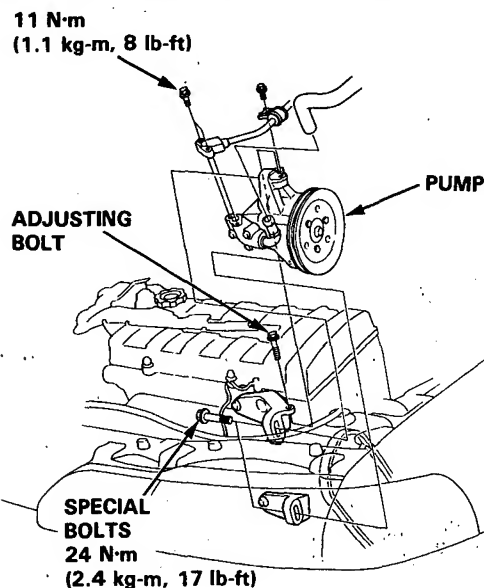
## Replacement

**NOTE:** Before disconnecting the hoses from the pump, place a suitable container under the car.

1. Drain the fluid from the system (see page 17-18).
2. Disconnect the inlet and outlet hoses from the pump and plug them.
3. Remove the belt by loosening the special bolts and adjusting bolt.

**NOTE:** Take care not to spill the fluid on the body and parts. Wipe off the spilled fluid at once.

4. Remove the special bolt, then remove the pump.

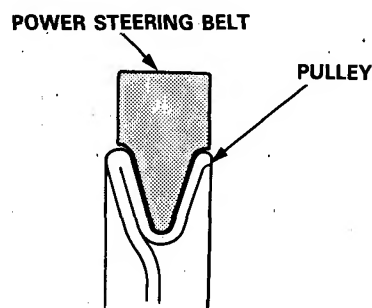


**NOTE:** Do not turn the steering wheel while the pump is removed.

5. Loosely install a new pump on the bracket.
6. Connect the inlet and outlet hoses to the pump.
7. Install and adjust the belt (see page 17-17).

### CAUTION:

- Make sure that the power steering belt is securely on the groove of the pulleys.
- Do not get power steering fluid or grease in the power steering belt or pulley faces. Clean off any fluid or grease before installation.

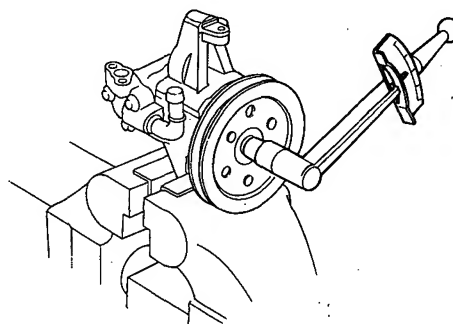


8. Fill the reservoir with new fluid to the upper level line on the reservoir (see page 17-18).

## Preload Inspection

Check the pump preload with a torque wrench after overhauling a pump or installing a replacement pump.

**Preload:** 4 N·m (0.4 kg-m, 3 lb-ft) max.

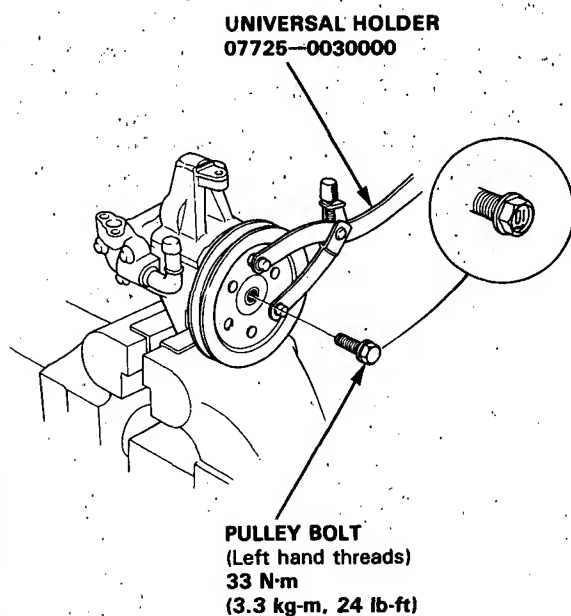


# Steering Pump

## Pulley Replacement

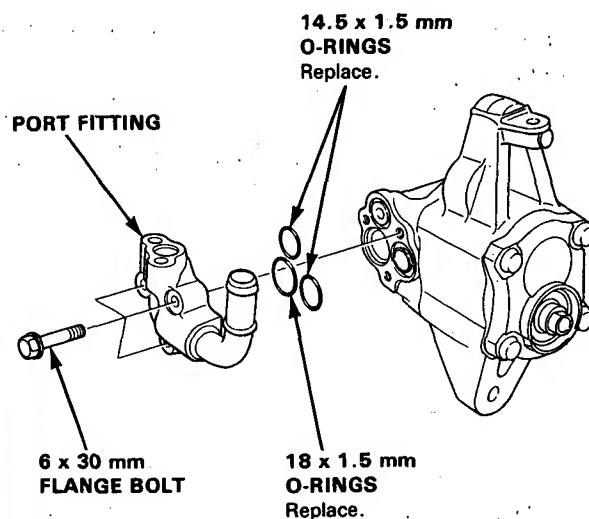
Hold the steering pump in a vise with soft jaws, and hold the pulley with the special tool and remove the pulley bolt and pulley.

NOTE: Pulley bolt has left hand threads.

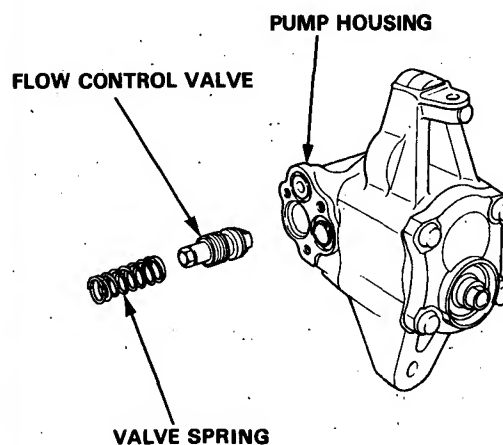


## Flow Control Valve Inspection and Replacement

1. Remove the three 6 x 30 mm flange bolts, then remove the port fitting and O-rings.

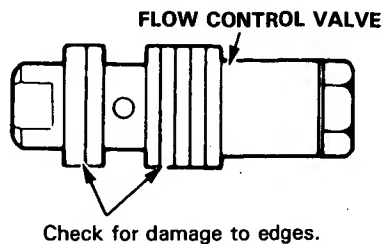


2. Remove the valve spring and flow control valve from the pump housing.

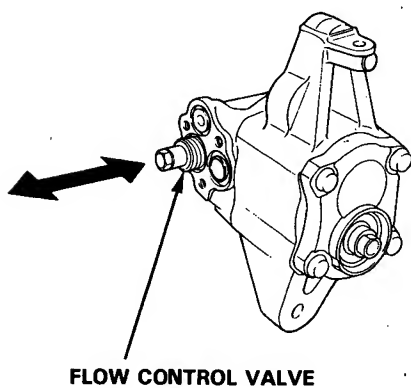




3. Check for wear, burrs, and other damage to the edges of the grooves in the flow control valve.

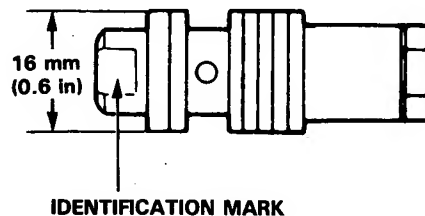


4. Slip the flow control valve back in the pump housing and check that it moves in and out smoothly.



If OK, go on to step 5, if not, replace the flow control valve:

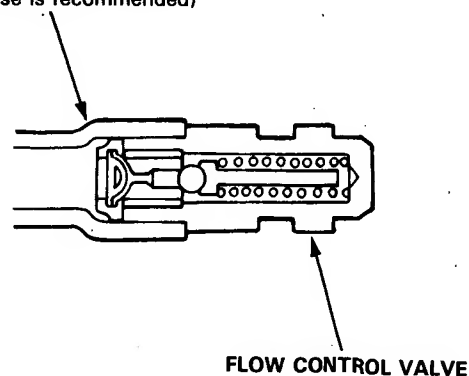
- The original valve was selected for a precise fit in the pump housing bore, so make sure the new one has the same identification mark.



Mark	Part Name	Size: mm (in)
A	FLOW CONTROL VALVE A	15.995–16.000 (0.6297–0.6299)
Without mark	FLOW CONTROL VALVE B	16.000–16.006 (0.6299–0.6302)

5. Attach a hose to the end of the flow control valve as shown.

**HOSE**  
9.5 mm ID (0.37 in)  
(The power steering return hose is recommended)



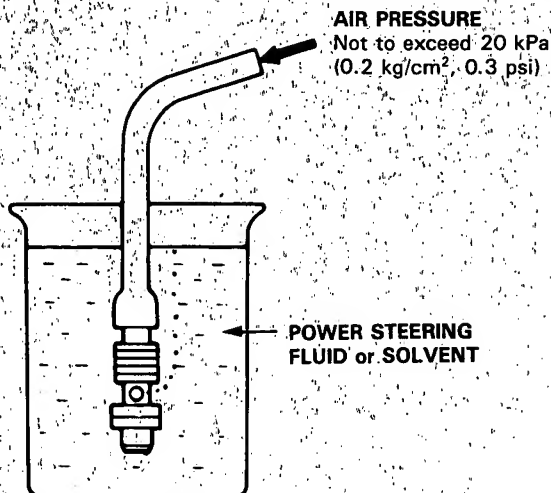
(cont'd)

# Steering Pump

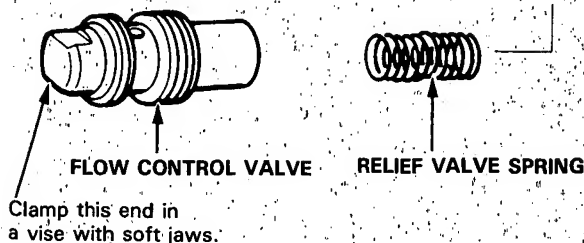
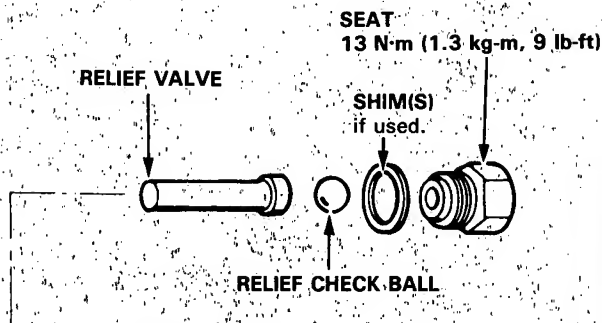
## Flow Control Valve Inspection and Replacement (cont'd)

- Then submerge the flow control valve in a container of power steering fluid or solvent, and blow gently on the hose. If air bubbles leak through the flow control valve, replace or repair it as follows.

NOTE: Do not use compressed air.



- Clamp the bottom end of the flow control valve in a vise with soft jaws.
- Unscrew the seat in the top end of the flow control valve, and remove any shims, the relief check ball, relief valve and relief valve spring.



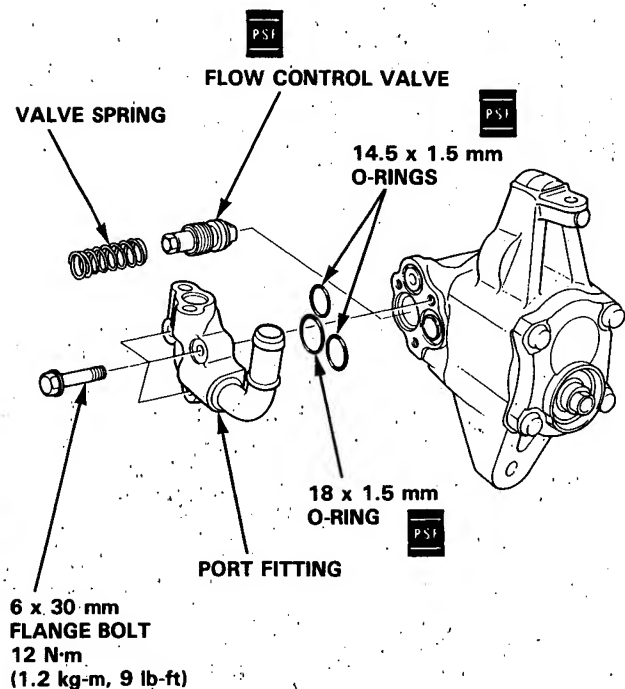
- Clean all the parts in solvent, dry them off, then reassemble and retest the flow control valve.

NOTE: If necessary, relief pressure is adjusted at the factory by adding shims under the seat. If you found shims in your valve, be sure you reinstall as many as you took out.

- Install the flow control valve in the reverse order of removal.

- Coat the flow control valve and new O-rings with the recommended power steering fluid then install them and valve spring.

NOTE: When replacing the flow control valve, be sure the replacement flow control valve has the same identification letter as the original flow control valve.



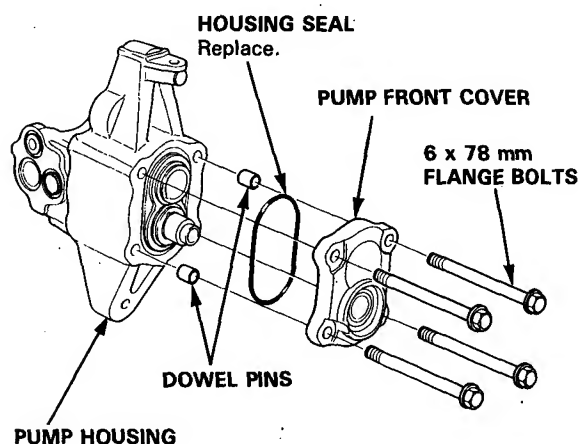




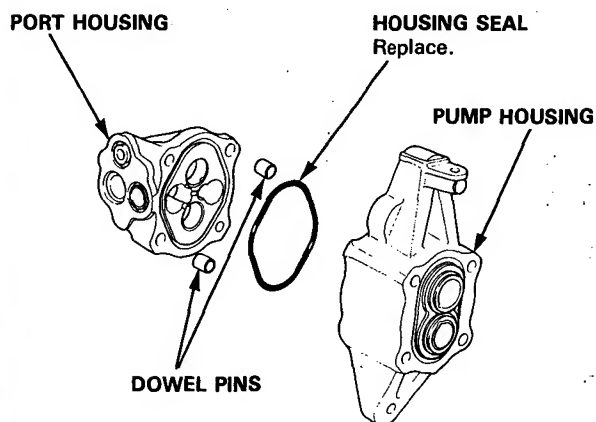
## Housing Disassembly

**CAUTION:** The pump components are made of aluminum. Be careful not to damage them when servicing.

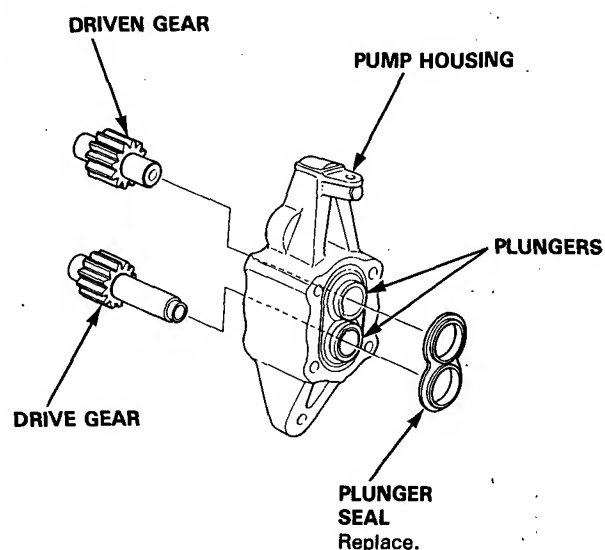
1. Remove the pump from car (see page 17-33).
2. Remove the pulley (see page 17-34).
3. Remove the port fitting and flow control valve (see page 17-36).
4. Remove the four flange bolts, then remove the pump front cover.
5. Remove the dowel pins and housing seal from the pump housing.



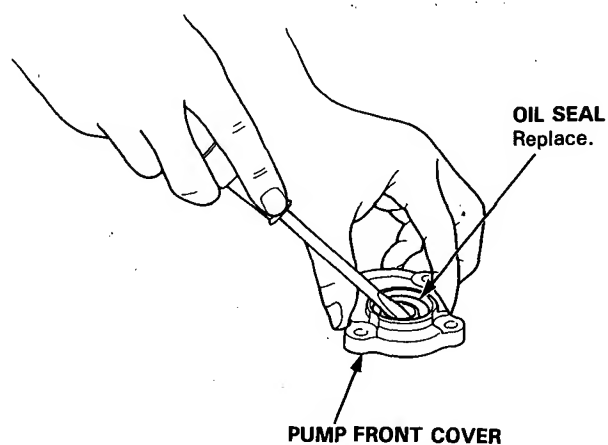
6. Separate the port housing from the pump housing.
7. Remove the housing seal and dowel pins.



8. Remove the pump drive and driven gears from the pump housing.
9. Remove the plunger seal and plungers.



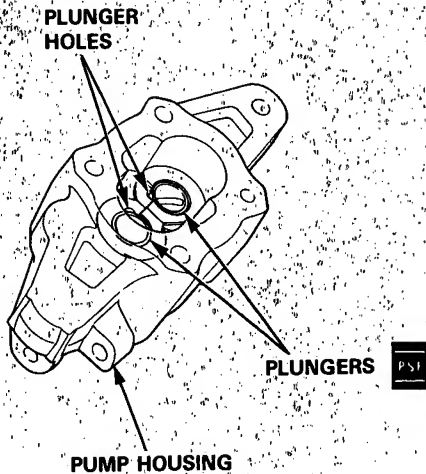
10. Pry the Oil seal out from the pump front cover.



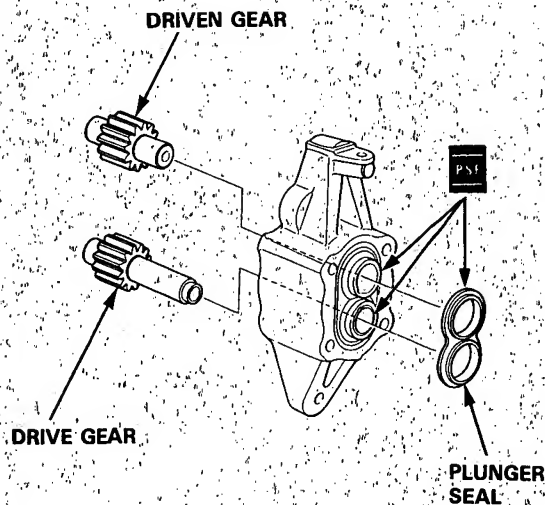
# Steering Pump

## Housing Reassembly

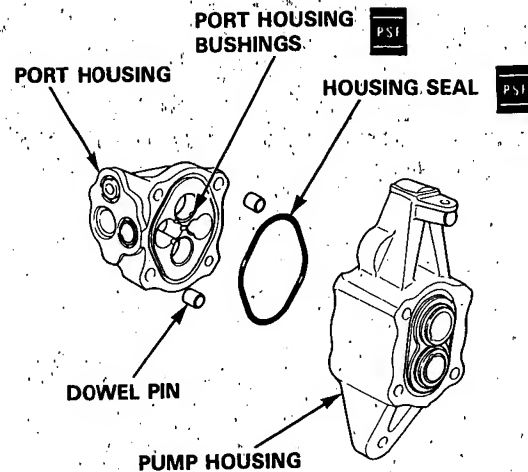
1. Coat the outer surfaces of the plungers with power steering fluid, then install them in the pump housing. Make sure the plunger holes are positioned as shown.



2. Coat the inside of the plungers and plunger seal with power steering fluid.
3. Install the drive and driven gears in the pump housing.
4. Install the new plunger seal over the plungers.

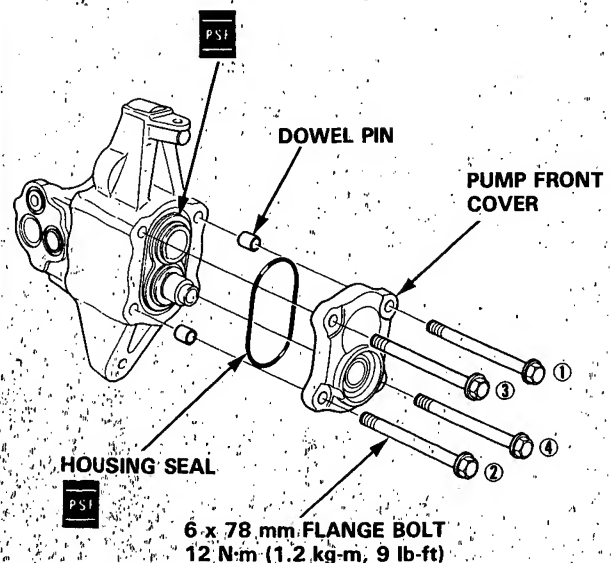


5. Coat the bushings on the port housing and new housing seal with power steering fluid.
6. Install the dowel pins in the pump housing, then install the new housing seal in the port housing.
7. Install the port housing on the pump housing.



8. Install the dowel pins.
9. Fill the groove of the pump housing with power steering fluid and install the new housing seal in the pump housing.
10. Install the pump front cover.

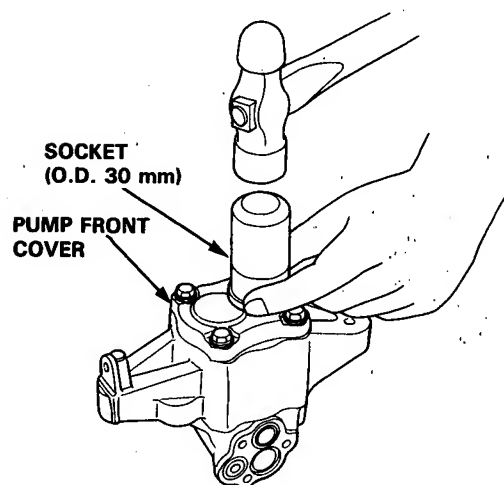
NOTE: Tighten the 6 x 78 mm flange bolts in the order shown.





11. Install the new oil seal in the pump front cover; get it started by hand, then use a socket to push it in the rest of the way.

NOTE: The oil seal spring may come out of position if the oil seal is not installed squarely.



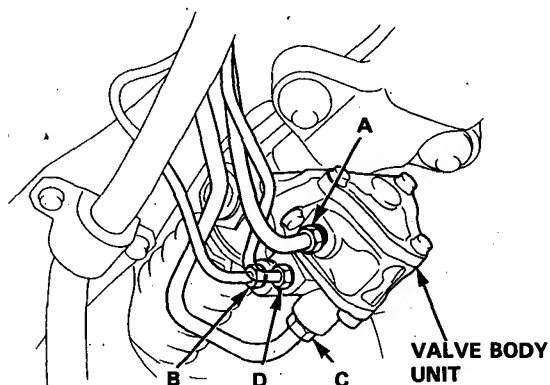
12. Install the flow control valve, valve spring and port fitting (see page 17-36).
13. Install the pulley (see page 17-34) and check the pump preload with a torque wrench (see page 17-33).

# Steering Gearbox

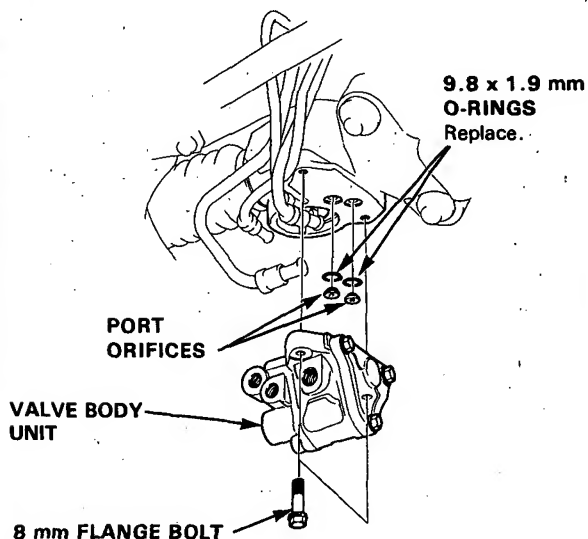
## Valve Body Unit Overhaul

### Removal

1. Drain the power steering fluid (see page 17-18).
2. Remove the gearbox shield.
3. Using solvent and a brush, wash any oil and dirt off the valve body unit, its lines, and that end of the gearbox. Blow them dry with compressed air.
4. Using flare nut wrenches, disconnect the four lines from the valve body unit.  
A: From pump: 14 mm wrench  
B: To reservoir: 12 mm wrench  
C: To oil cooler: 17 mm wrench  
D: To power steering speed sensor: 12 mm wrench

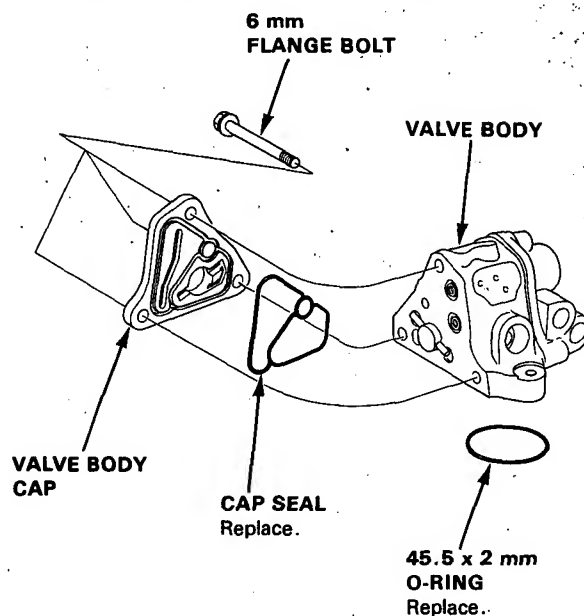


5. Remove the two 8 mm flange bolts and remove the valve body unit from the gearbox.
6. Remove the O-rings and port orifices from the gearbox.

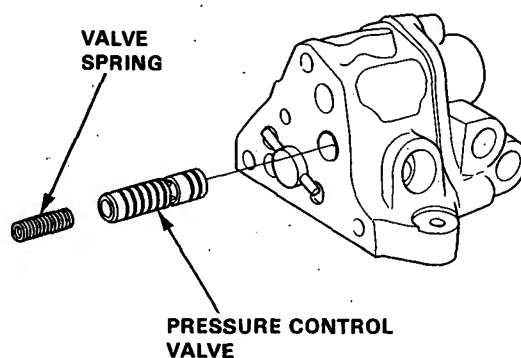


### Disassembly

7. Remove the O-ring from the valve body.
8. Remove the three 6 mm flange bolts, and remove the valve body cap from the valve body.
9. Remove the cap seal from the cap.



10. Remove the pressure control valve and valve spring from the valve body.



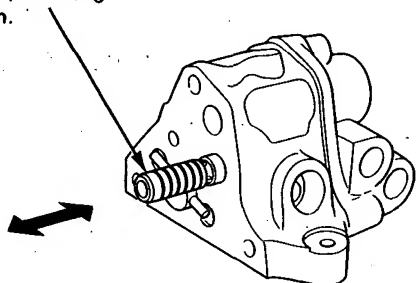


11. Check the pressure control valve.

- Inspect its surface for scoring or scratches.
- Slip it back into the valve body, and make sure it slides smoothly without drag and without side play.

**PRESSURE CONTROL VALVE**

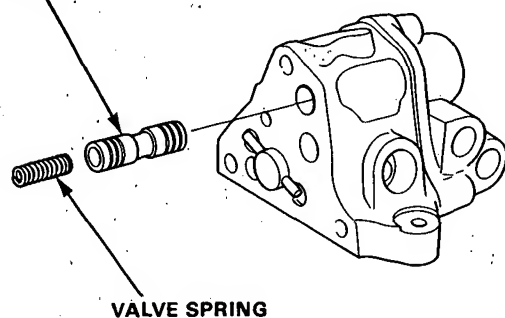
Check for scoring or scratches, and rough operation.



**NOTE:** If the valve body is damaged, replace the valve body unit as an assembly.

12. Remove the gain control valve and valve spring from the valve body.

**GAIN CONTROL VALVE**

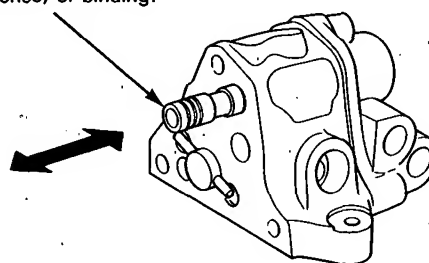


13. Check the gain control valve.

- Inspect its surface for scoring or scratches.
- Slip it back into the valve body and make sure it slides smoothly without drag and without side play.

**GAIN CONTROL VALVE**

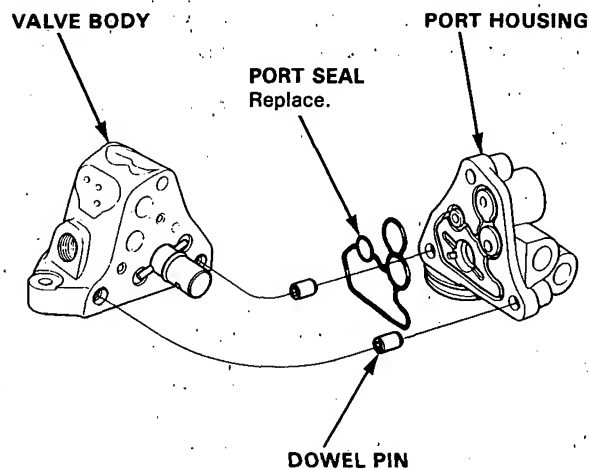
Check for scoring, scratches, or binding.



**NOTE:** If the valve body is damaged, replace the valve body unit as an assembly.

14. Separate the valve body and port housing.

15. Remove the port seal and dowel pins from the port housing.



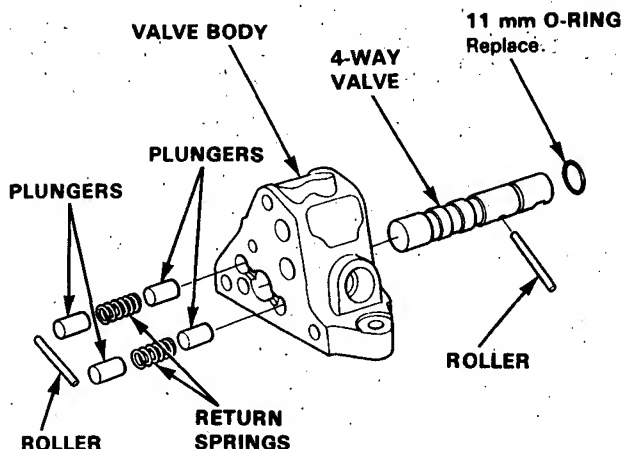
(cont'd)

# Steering Gearbox

## Valve Body Unit Overhaul (cont'd)

16. Remove the rollers from the 4-way valve by pushing the valve out one side of the valve body, and then the other.

NOTE: When removing the rollers, hold the plungers with your fingers to keep them from popping out.



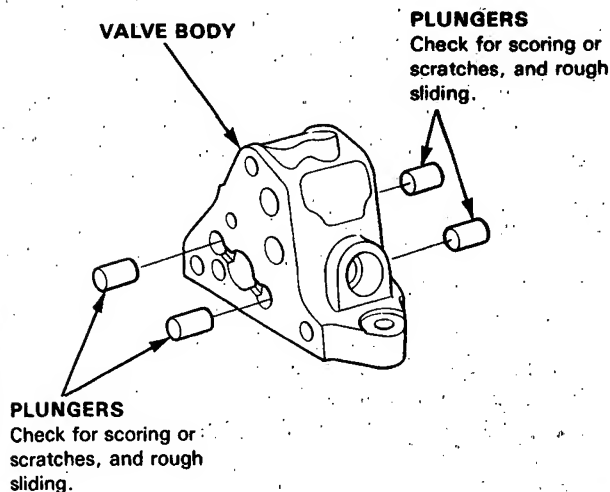
17. Remove the plungers, return springs and 4-way valve from the valve body.

18. Remove the 11 mm O-ring from the 4-way valve.

19. Check the plungers.

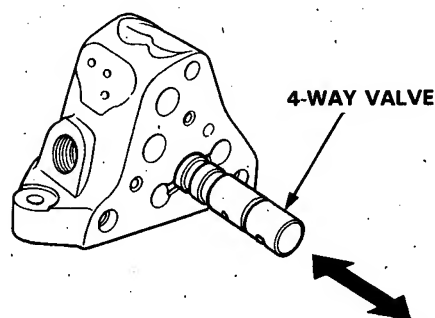
- Inspect their surface for scoring or scratches.
- Slip each plunger into the valve body, and make sure it slides smoothly, without drag or side play. If any plunger is damaged, replace it.

NOTE: If the valve body is damaged, replace the valve body unit as a set.



20. Check the 4-way valve.

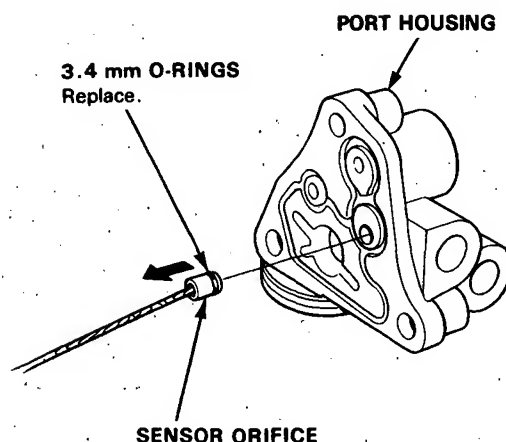
- Inspect its surface for scoring or scratches.
- Slip it into the valve body, and make sure it slides smoothly, without drag or side play.



NOTE:

- If the valve body is damaged, replace the valve body unit as an assembly.

21. Using a 1.5 mm (1/16") drill bit, remove the sensor orifice and O-ring.





# Steering Gearbox

## Valve Body Unit Overhaul

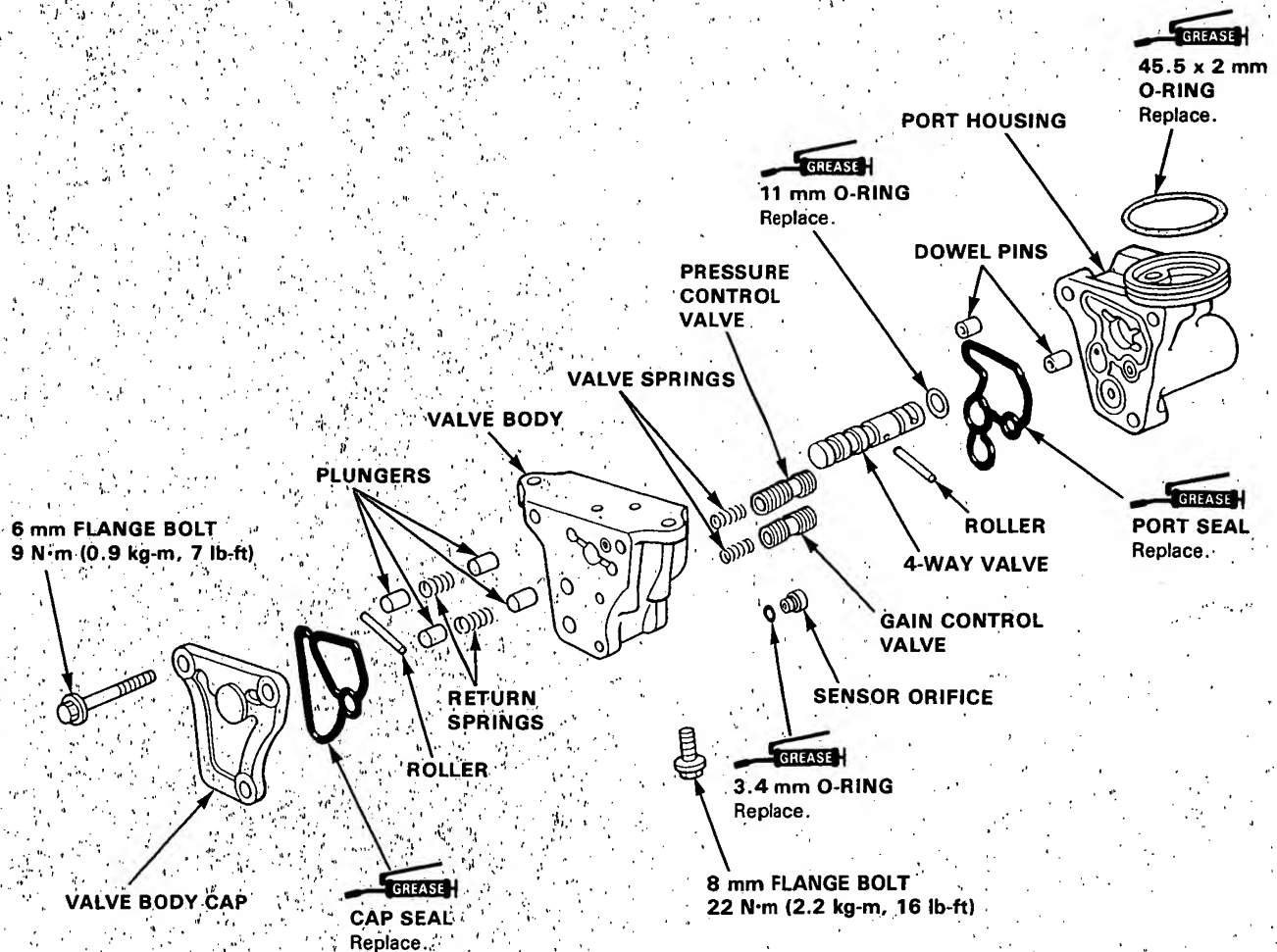
### Assembly

1. Thoroughly clean the disassembled parts shown below.
2. Coat the plungers, pressure control valve, gain control valve and 4-way valve surfaces with power steering fluid.
3. Reassemble the parts in the reverse order of disassembly.

### CAUTION:

- Replace the O-rings and seals with new ones.
- Do not dip the O-rings and seals in solvent.
- Apply grease in the seal grooves to keep the seals in place.
- Apply grease to new O-rings to keep them in place.

-  : STEERING GREASE (Part Number 08733-B070E)

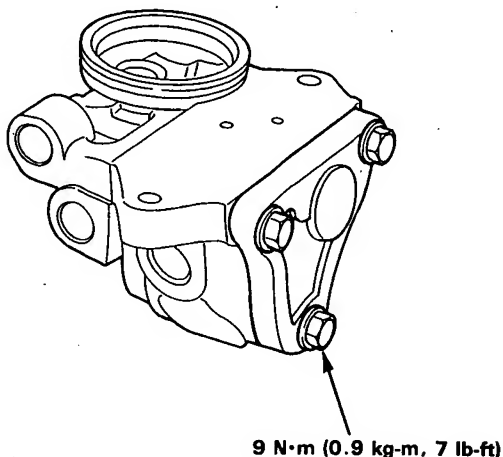


NOTE: If the valve body is damaged, replace the valve body unit as an assembly.

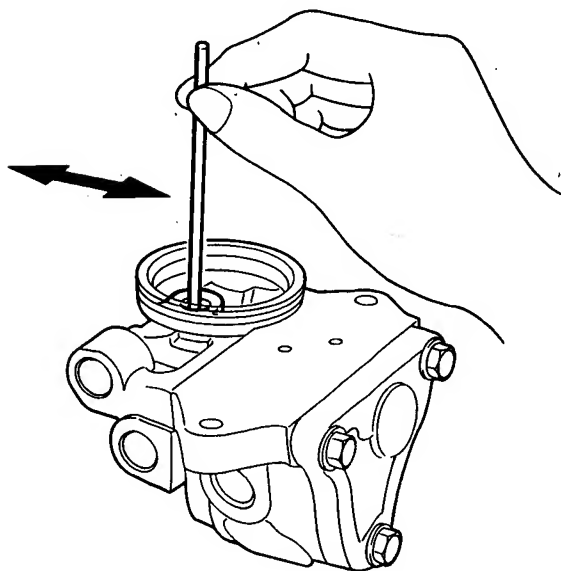




4. Install and tighten the 6 mm flange bolts.



5. Make sure the 4-way valve moves smoothly, and returns to neutral position.

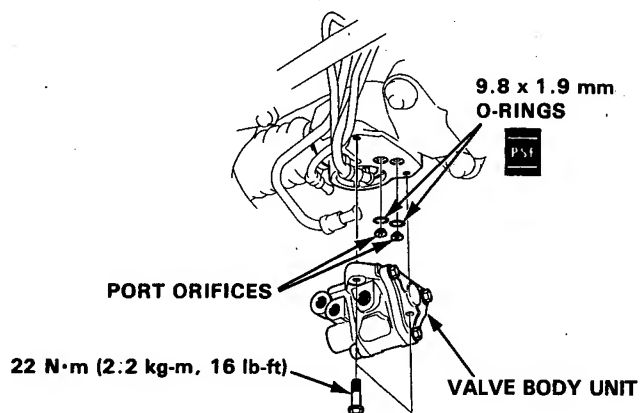


#### Installation

6. Coat the 9.8 x 1.9 mm O-rings with power steering fluid, and install them together with the orifices.
7. Install the valve body unit on the gear housing with the two 8 mm flange bolts.

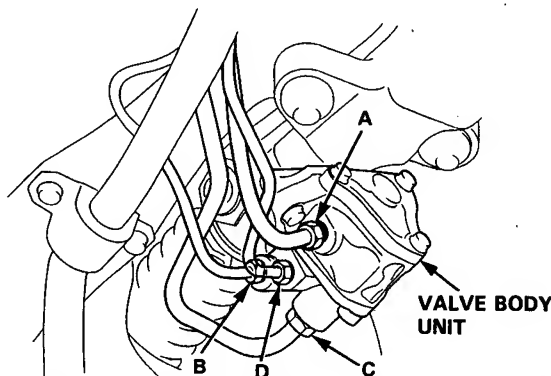
#### CAUTION:

- When installing, be careful not to hit the pinion holder pin.
- Make sure the O-rings are in place and not pinched.



8. Connect the four lines to the valve body unit, using flare nut wrenches.

- A: From pump: 14 mm wrench  
38 N·m (3.8 kg-m, 28 lb-ft)
- B: To reservoir: 12 mm wrench  
13 N·m (1.3 kg-m, 9 lb-ft)
- C: To oil cooler: 17 mm wrench  
29 N·m (2.9 kg-m, 20 lb-ft)
- D: To power steering speed sensor: 12 mm wrench  
13 N·m (1.3 kg-m, 9 lb-ft)



9. Fill the reservoir with power steering fluid and bleed air from the system by turning the steering wheel from lock to lock several times with the engine warm (see page 17-18).
10. Make sure there are no fluid leaks, then install the gearbox shield.
11. Recheck the fluid level in the reservoir.

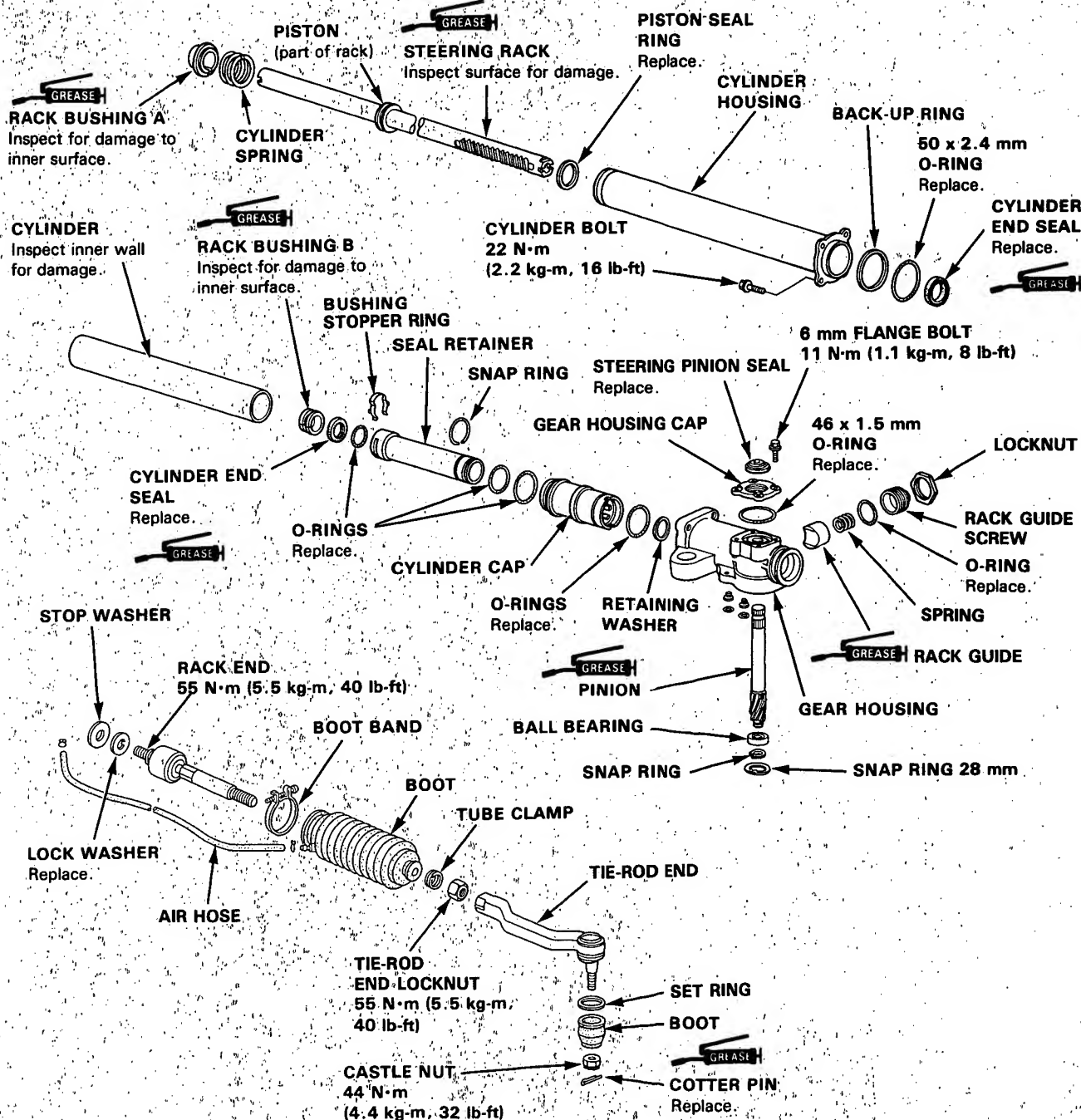
# Steering Gearbox

## Illustrated Index

### CAUTION:

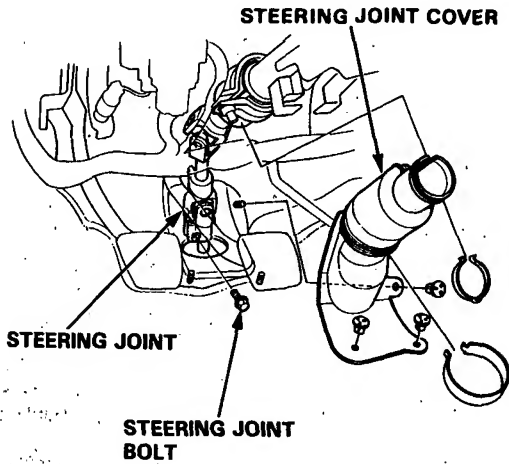
- Before disassembling the gearbox, wash it off with solvent and a brush.
- Thoroughly clean all disassembled parts.
- Always replace O-rings and seals.
- Replace parts with damaged sliding surfaces.
- Do not dip seals and O-rings in solvent; coat O-rings with grease or power steering fluid, make sure they stay in position during reassembly, and use the appropriate special tools to install them where necessary.

• **GREASE** : STEERING GREASE (Part Number 08733-B070E)

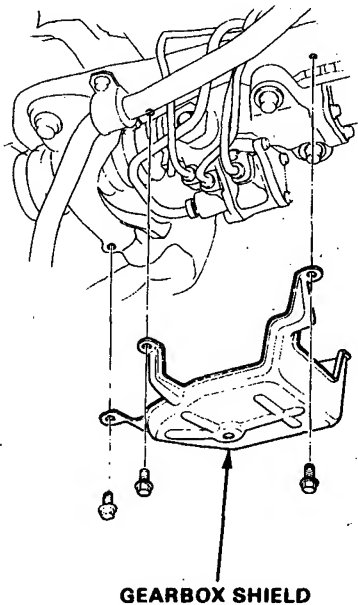




1. Remove the steering joint cover, and the steering joint bolt, then move the steering joint toward the column.



2. Drain the power steering fluid as described on see page 17-18.
3. Raise the front of car and support on safety stands in the proper locations (see section 1).
4. Remove the gearbox shield.
5. Using solvent and a brush, wash any oil and dirt off the valve body unit, its lines, and that end of the gearbox. Blow them dry with compressed air.

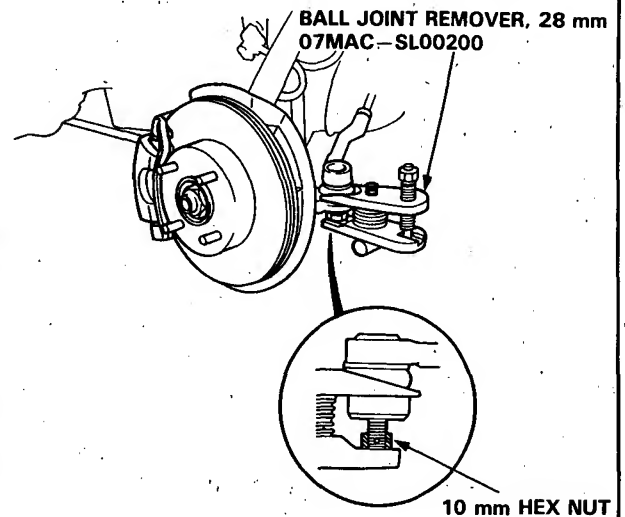


6. Remove the front wheels.
7. Remove the cotter pin from the castle nut and remove the nut.
8. Install a 10 mm hex nut on the ball joint. Be sure that the 10 mm hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

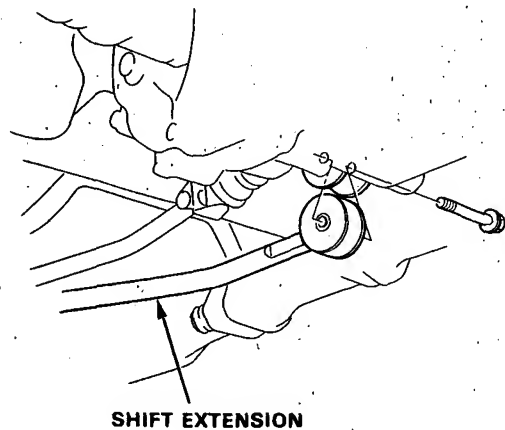
**NOTE:** Remove the ball joint using the Ball Joint Remover. Refer to see page 18-12 for how to use the ball joint remover.

9. Separate the tie-rod ball joint and knuckle using special tool.

**CAUTION:** Avoid damaging the ball joint boot.



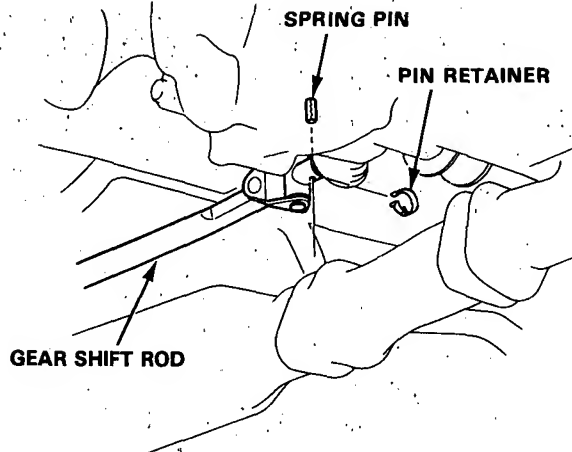
10-1. (Manual transmission model:)



# Steering Gearbox

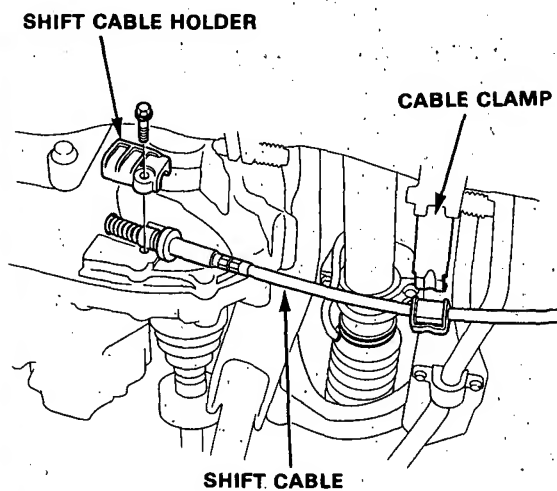
## Steering Rack Removal (cont'd)

- Slide the boot at the connecting position of the gear shift rod.
- Drive out the spring pin with a punch, then disconnect the gear shift rod.



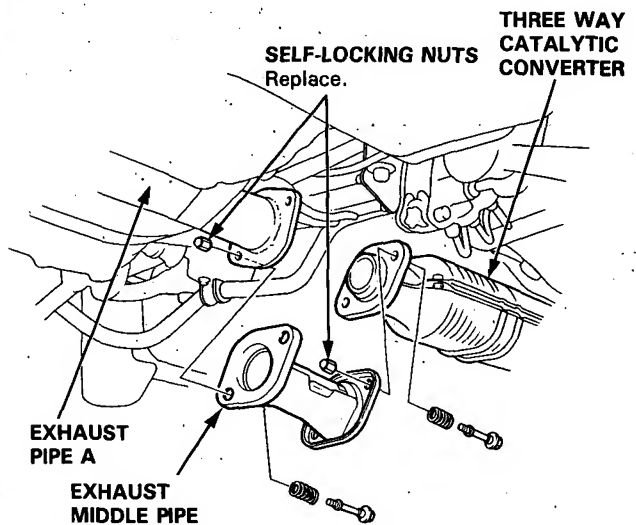
### 10-2. (Automatic transmission model:)

- Remove the shift cable holder and cable from the transmission case by removing the cable clamp.



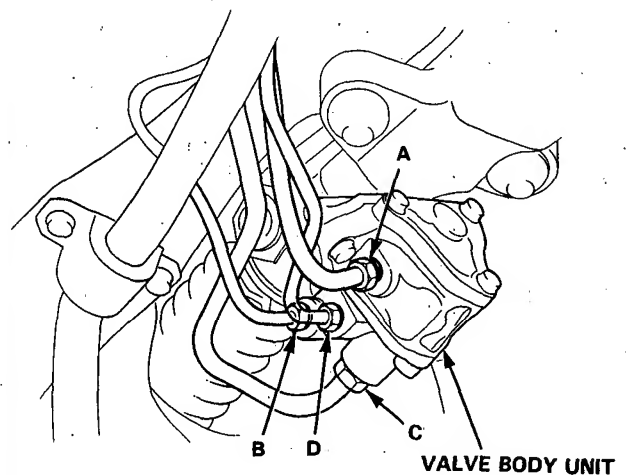
11. Remove the self-locking nuts that connect the exhaust middle pipe to the three way catalytic converter and exhaust pipe A.

**CAUTION:** Replace the exhaust gasket and self-locking nuts when you reinstall the pipe.



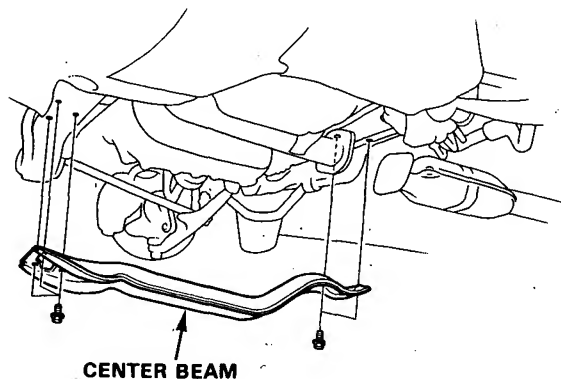
12. Disconnect the four lines from the valve body unit.

- |                                   |              |
|-----------------------------------|--------------|
| A: From pump                      | 14 mm wrench |
| B: To reservoir                   | 12 mm wrench |
| C: To oil cooler                  | 17 mm wrench |
| D: To power steering speed sensor | 12 mm wrench |

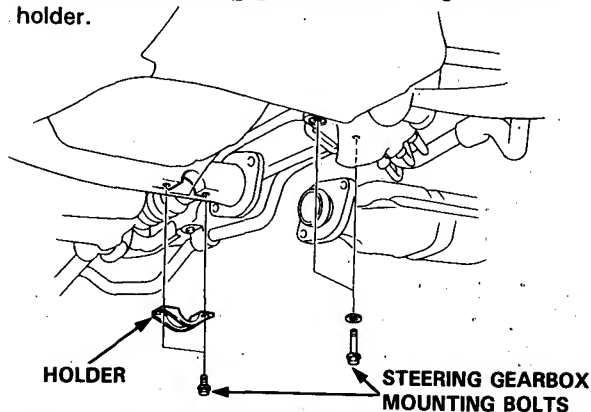




13. Remove the center beam.



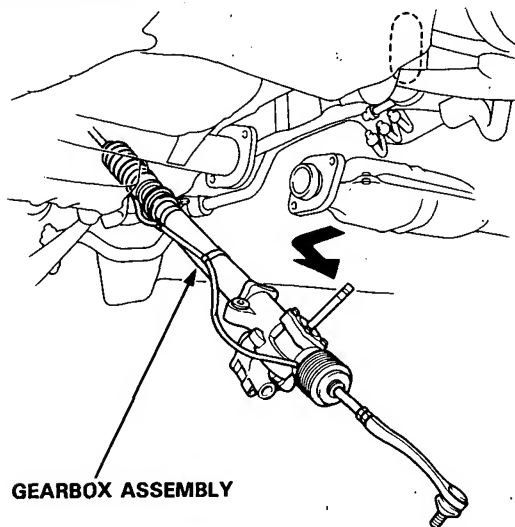
14. Remove the steering gearbox mounting bolts and holder.



15. Slide the tie-rod all the way to the right side.

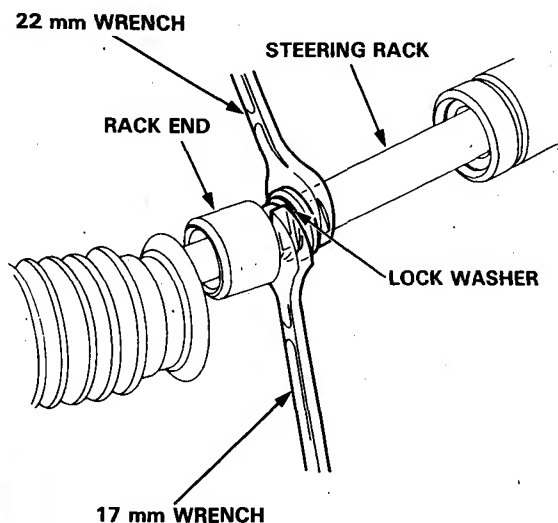
16. Slide the gearbox right so that the left tie rod clears the bottom of the rear beam, then remove the gearbox assembly.

**CAUTION:** Be careful not to bend or damage the four power steering lines when removing the gearbox assembly.

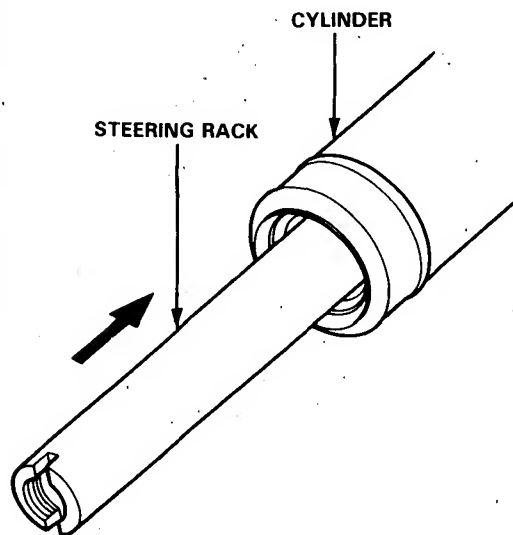


## Overhaul

1. Carefully clamp the gearbox in a vise with soft jaws.
2. Loosen the bands, pull the boots away from the ends of the gearbox, and unbend the lock washers. Hold the rack with a 22 mm wrench, and unscrew the rack end with a 17 mm wrench.



3. Push the right end of the rack back into the cylinder housing so the smooth surface that rides against the seal won't be damaged.



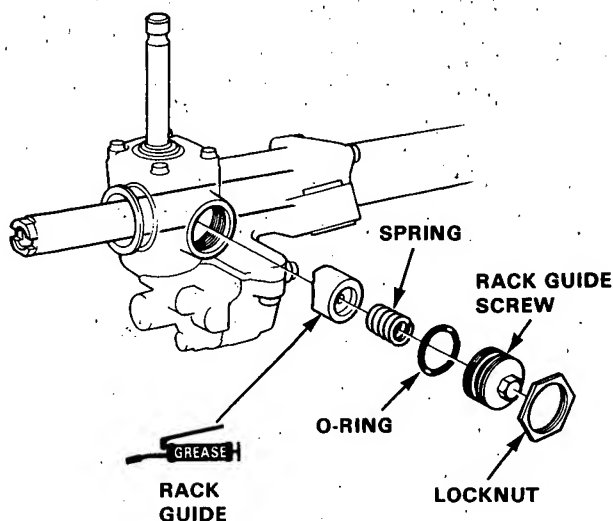
(cont'd)

# Steering Gearbox

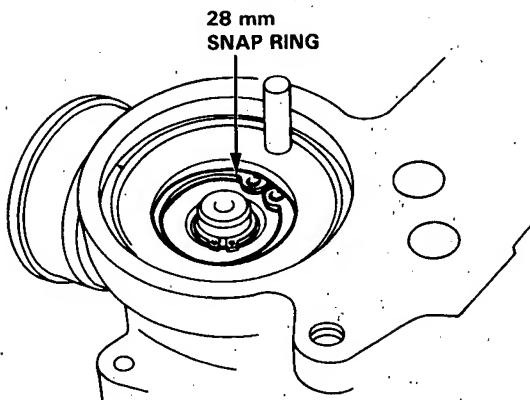
## Overhaul(cont'd)

4. Loosen the locknut, and remove the rack guide screw, spring and rack guide.

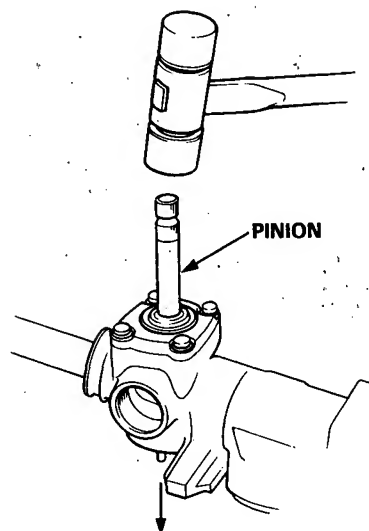
5. Remove the valve body unit as described (see page 17-40).



6. Remove the 28 mm snap ring from the bottom of the gear housing.

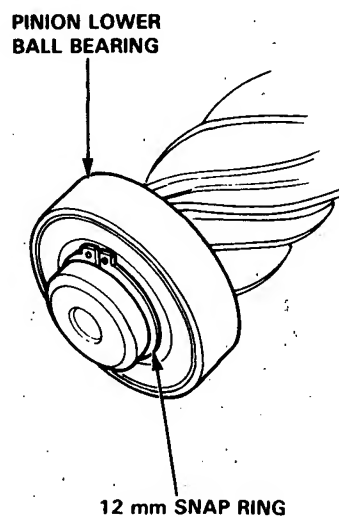


7. Remove the pinion from the gear housing by tapping it lightly.



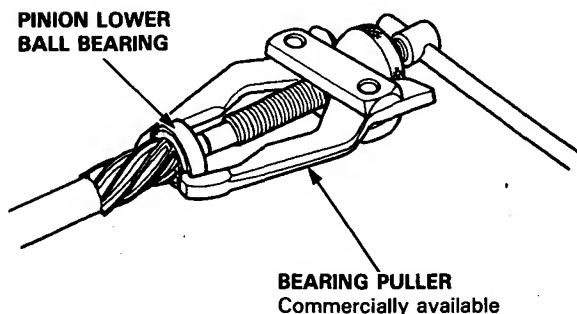
8. Check the pinion lower ball bearing for play. If it is good go on step 10. If the bearing is noisy or has excessive play, replace the bearing.

- Remove the 12 mm snap ring.





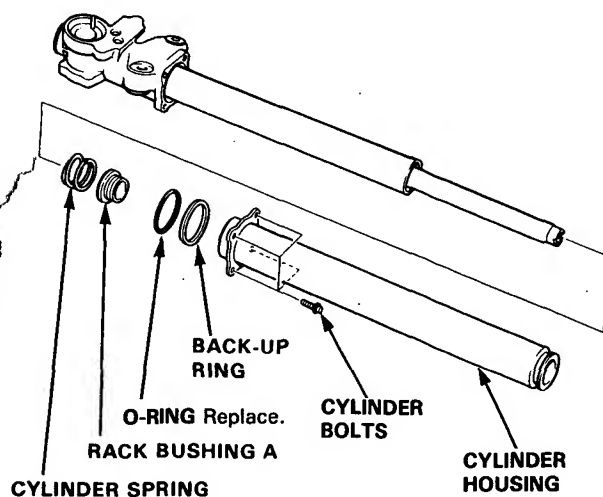
9. Remove the pinion lower ball bearing using a commercially available bearing puller. For bearing installation, go to step 51.



10. Remove the four cylinder bolts from the end of the cylinder housing, then slide the housing off the rack.

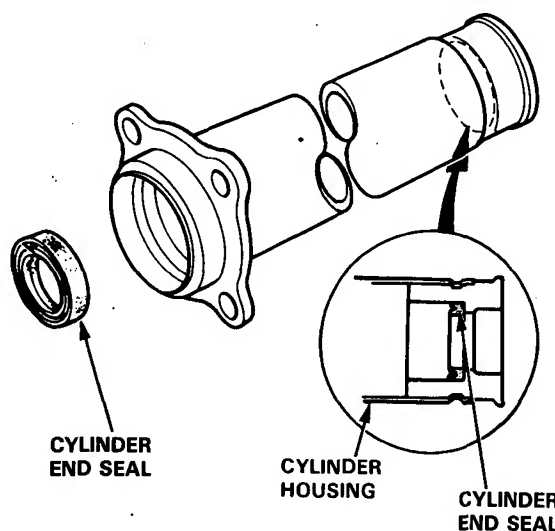
11. Remove the cylinder housing.

12. Remove the O-ring, back-up ring, steering rack bushing A and cylinder spring.

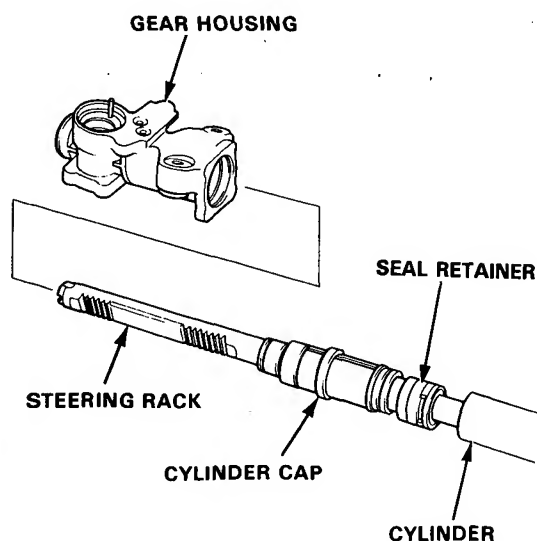


13. Remove the cylinder end seal from the cylinder housing.

**NOTE:** Use your fingers or a wooden stick to avoid damaging the housing.



14. Remove the cylinder, seal retainer, cylinder cap and steering rack from the gear housing.

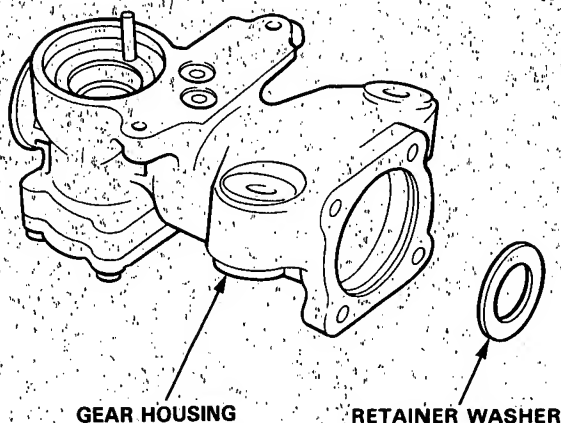


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# Steering Gearbox

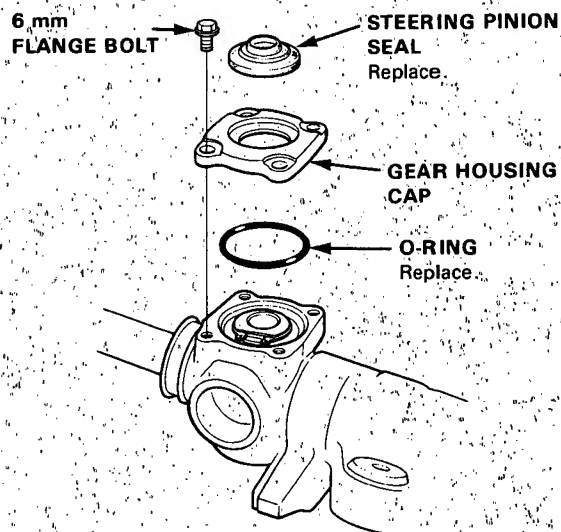
## Overhaul (cont'd)

15. Remove the retainer washer from the gear housing.



16. Remove the gear housing cap from the gear housing by removing the four 6 mm flange bolts.

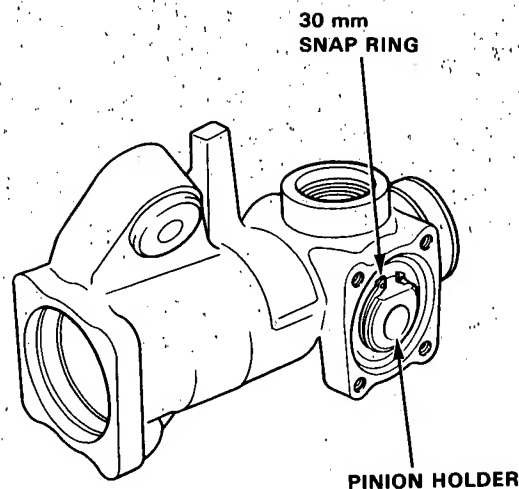
17. Remove the steering pinion seal from the gear housing cap.



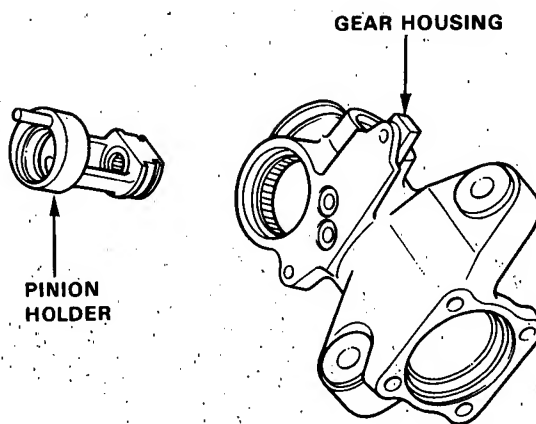
19. Remove the O-ring from the gear housing.

19. Check the pinion holder for free movement, excessive play; if it is OK go to step 20. If it is damaged, or if dirt has gone past the seal into the grease, replace the bearing.

- Remove the 30 mm snap ring from the pinion holder.



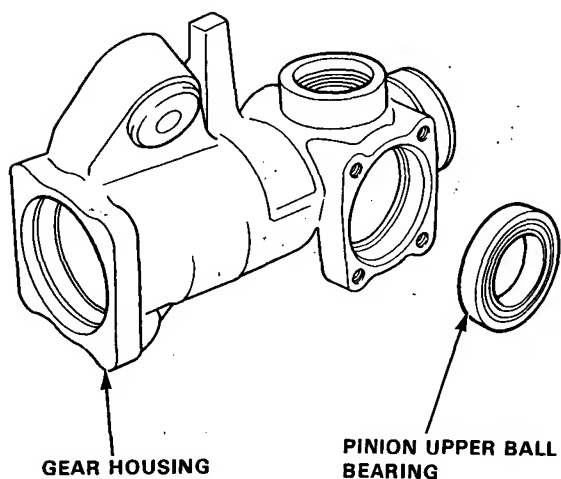
- Remove the pinion holder from the gear housing.



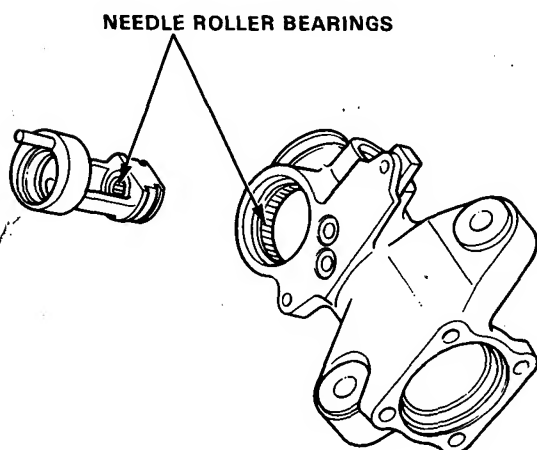




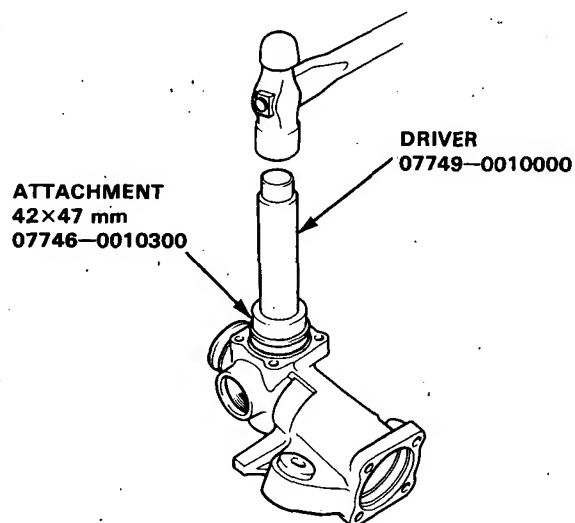
- Remove the pinion upper ball bearing from the gear housing.



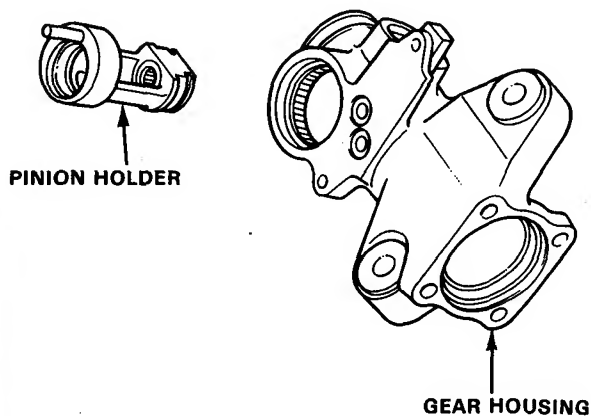
- Check the needle roller bearing in the pinion holder and in the gear housing for damage; if they are OK, pack them with grease. If the bearings are damaged, replace them as a set.



- Pack a new pinion upper ball bearing with grease, then drive the bearing into the gear housing using the special tools with its sealed side facing out.



- Install the pinion holder in the gear housing.



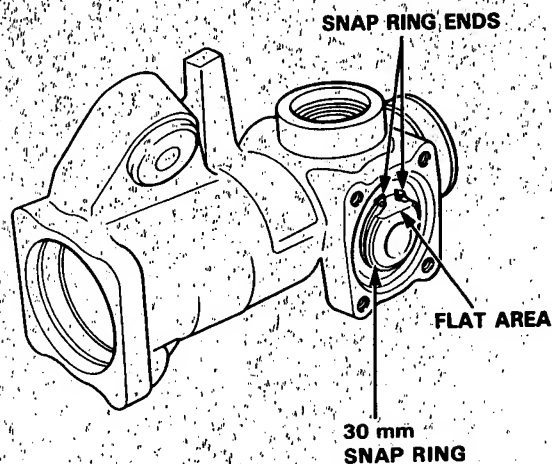
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# Steering Gearbox

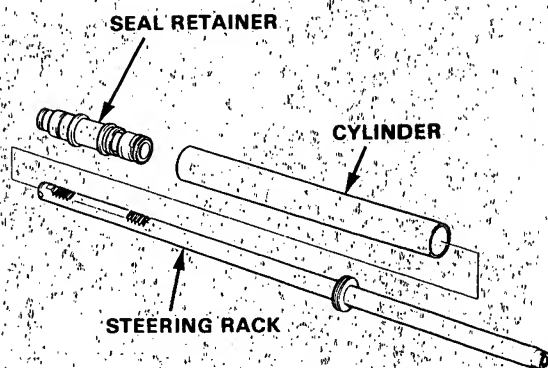
## Overhaul (cont'd)

- Reinstall the 30 mm snap ring with its tapered side facing out.

NOTE: Snap ring ends must be aligned with the flat area.



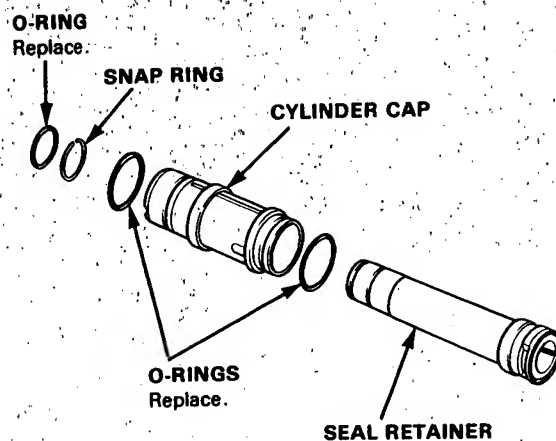
20. Remove the cylinder and seal retainer from the steering rack.



21. Remove the O-rings and snap ring from the seal retainer.

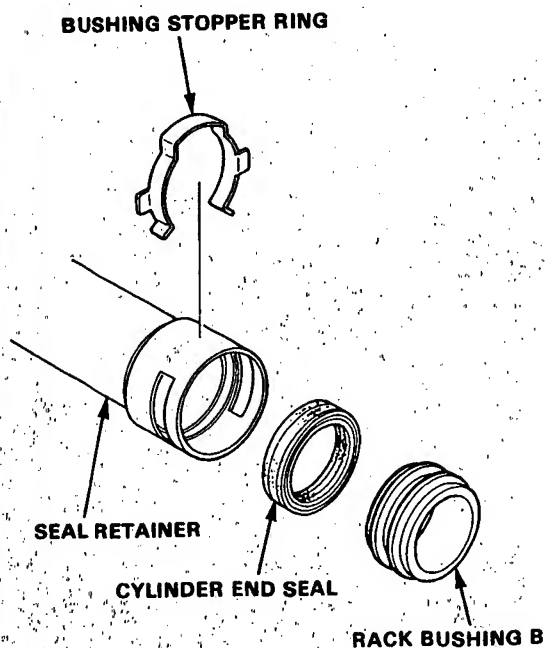
22. Remove the cylinder cap from the seal retainer.

23. Remove the O-rings from the cylinder cap.



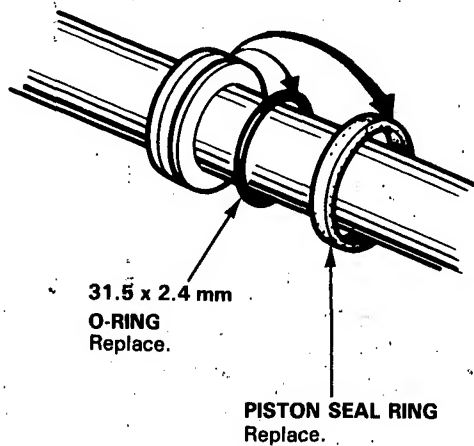
24. Remove the bushing stopper ring from the seal retainer.

25. Remove the cylinder end seal and rack bushing B.



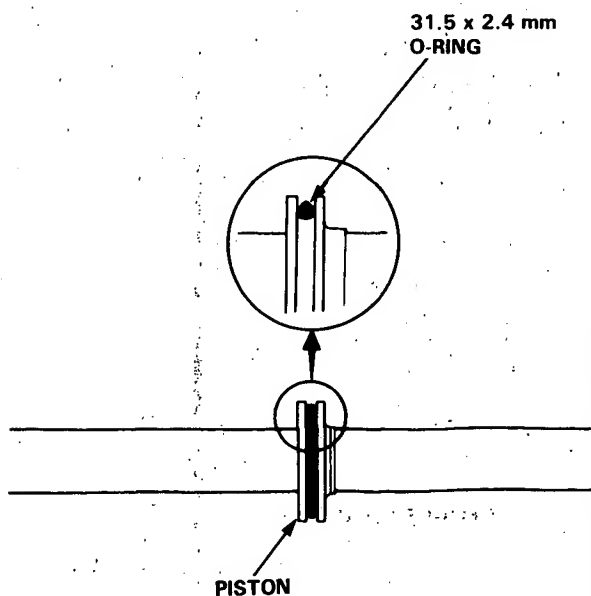


26. Carefully pry the piston seal ring and O-ring off the rack.



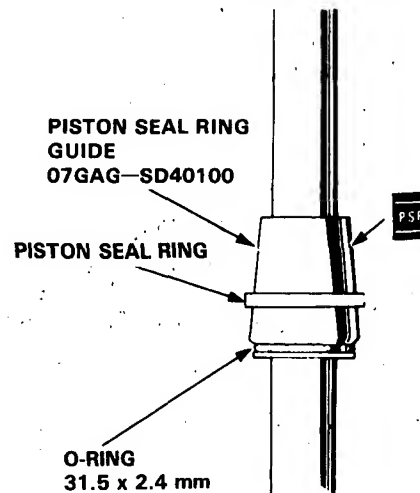
**NOTE:** Before reassembling any parts inspect them as described on see page 17-46 and make sure they are clean. Replace worn or damaged parts.

27. Install a new O-ring on the piston with its narrow edge facing out.



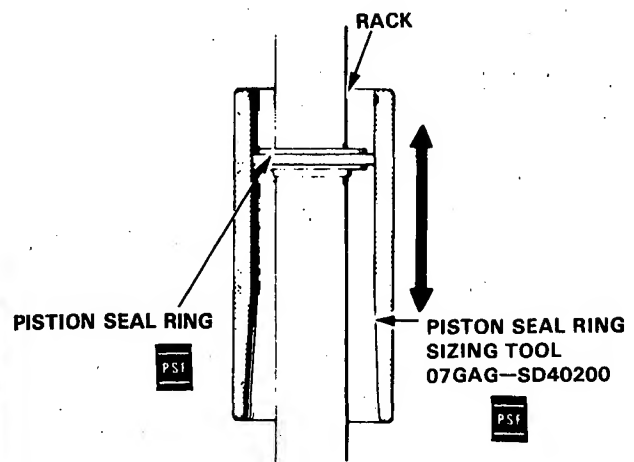
28. Coat the piston seal ring guide with power steering fluid, and slide it onto the rack, big end first.

29. Position the new piston seal ring on the special tool, slide it down onto the big end of the tool, and then pull it off into the piston groove on top of the O-ring.



30. Coat the piston seal ring and the inside of the special tool with the recommended power steering fluid.

Carefully slide the tool onto the rack and over the piston ring, then rotate the tool as you move it up and down to seat the piston ring.

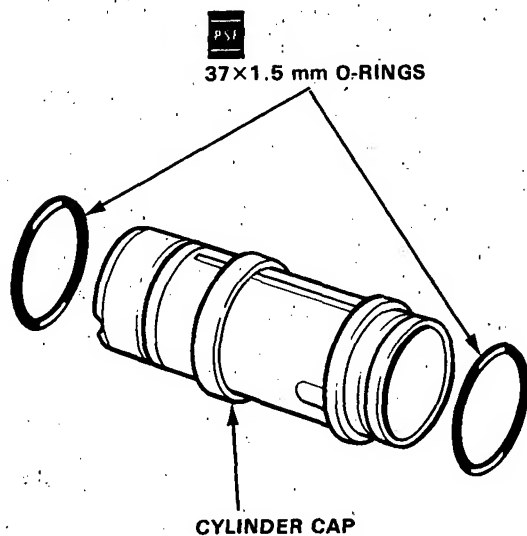


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# Steering Gearbox

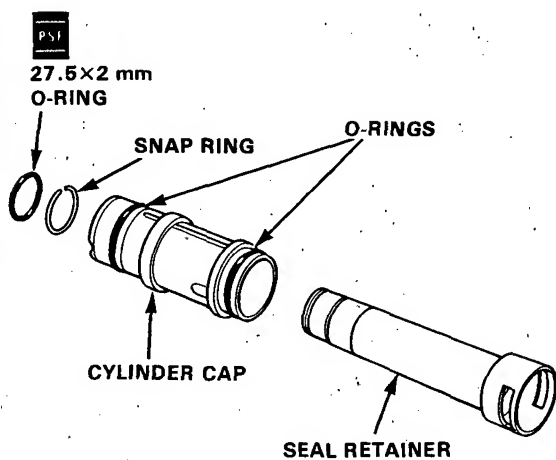
## Overhaul(cont'd)

31. Coat new O-rings with power steering fluid and install them on the cylinder cap.

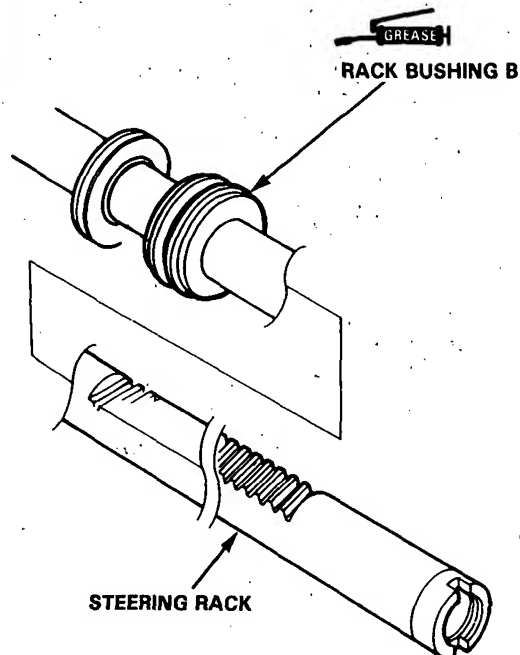


32. Slide the seal retainer onto the cylinder cap.

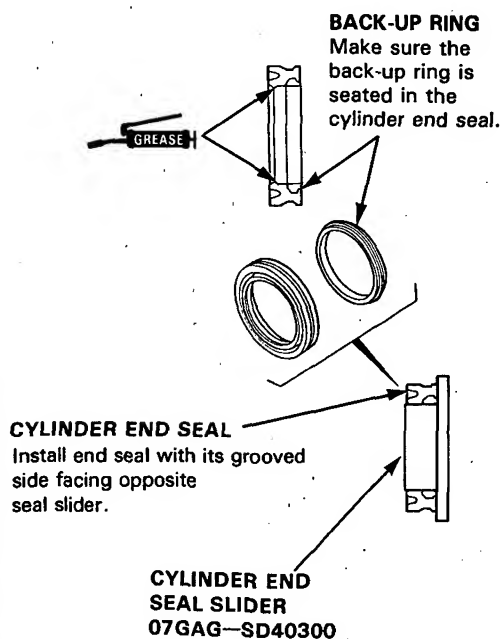
33. Install the snap ring and O-ring on the seal retainer.



34. Grease the sliding surface of the rack bushing B, and install the bushing on the steering rack.

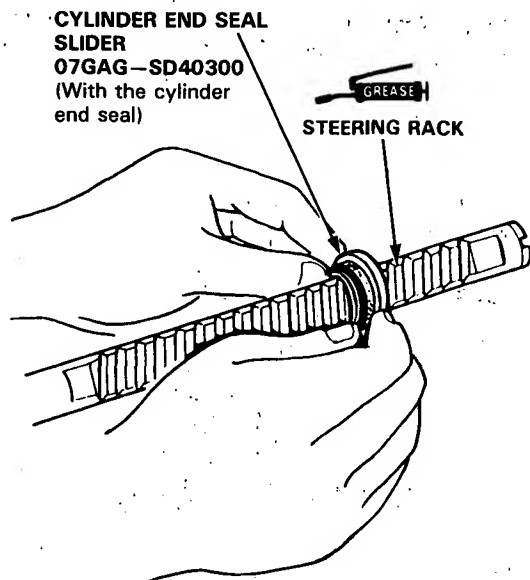


35. Grease the sliding surfaces of the new cylinder end seal and the special tool, then place the seal on the special tool with its grooved side facing opposite the slider.

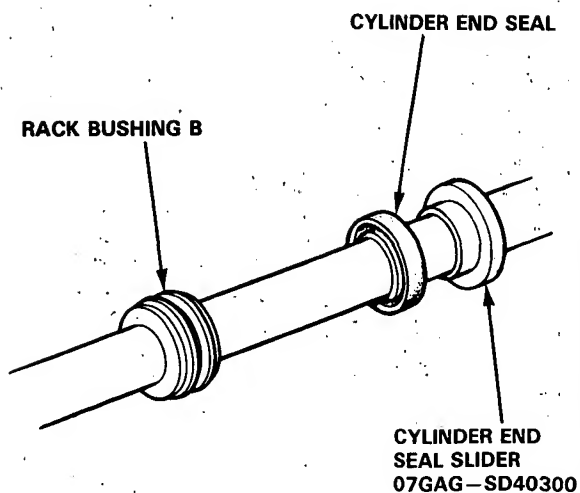




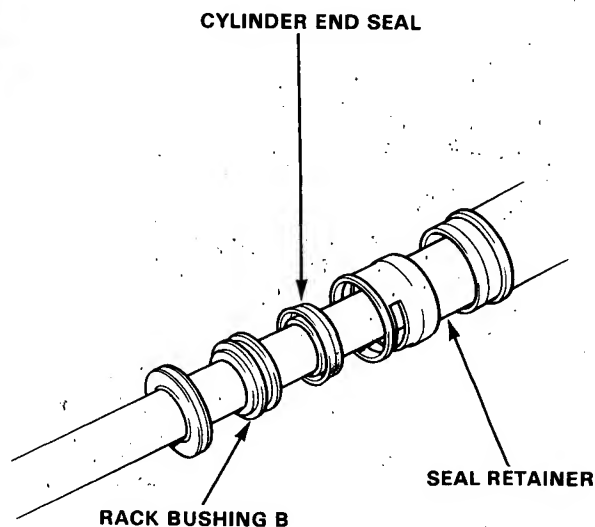
36. Grease the steering rack, and install the special tool.



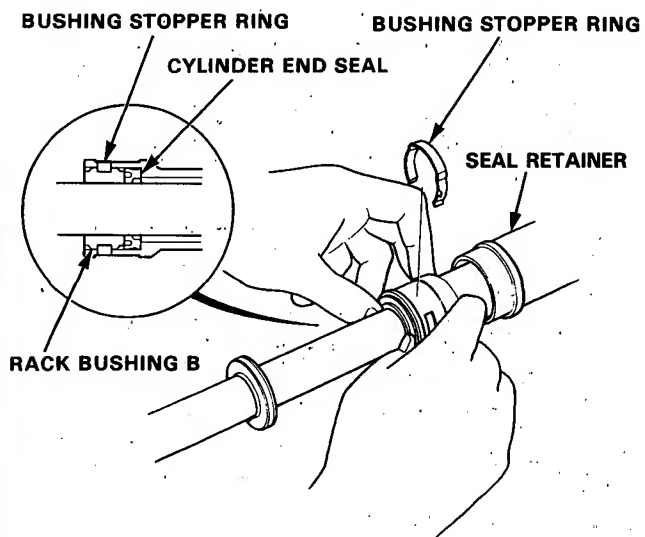
37. Separate the cylinder end seal from the special tool, then remove the special tool from the rack.



38. Fit the seal retainer on the steering rack.



39. Push the rack bushing B toward the seal retainer by hand until the cylinder end seal is seated in the retainer. Fit the bushing stopper ring in the groove of the seal retainer securely.

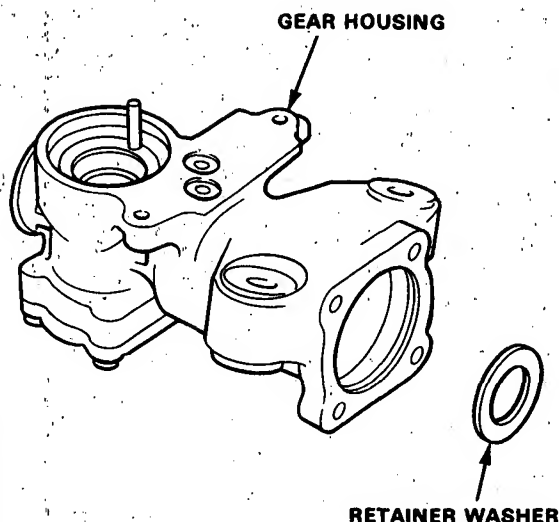


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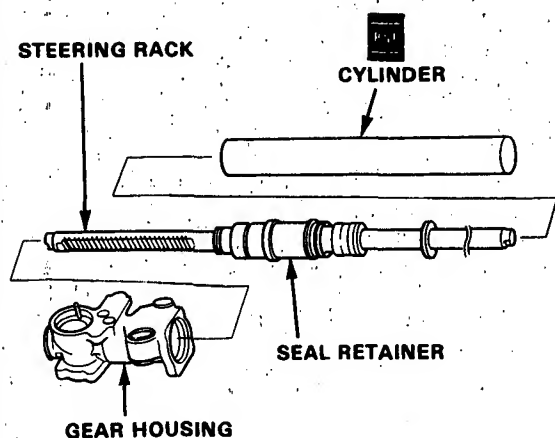
# Steering Gearbox

## Overhaul (cont'd)

40. Install the retainer washer on the gear housing.

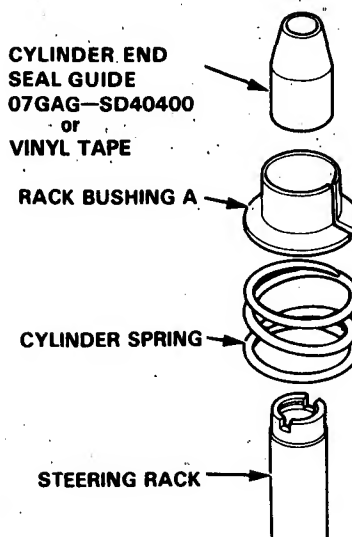


41. Place the gear housing on the work bench and insert the seal retainer and steering rack into the gear housing.
42. Coat the inside surface of the cylinder with power steering fluid, slide it over the rack and into the gear housing; press it into the housing until it seats.

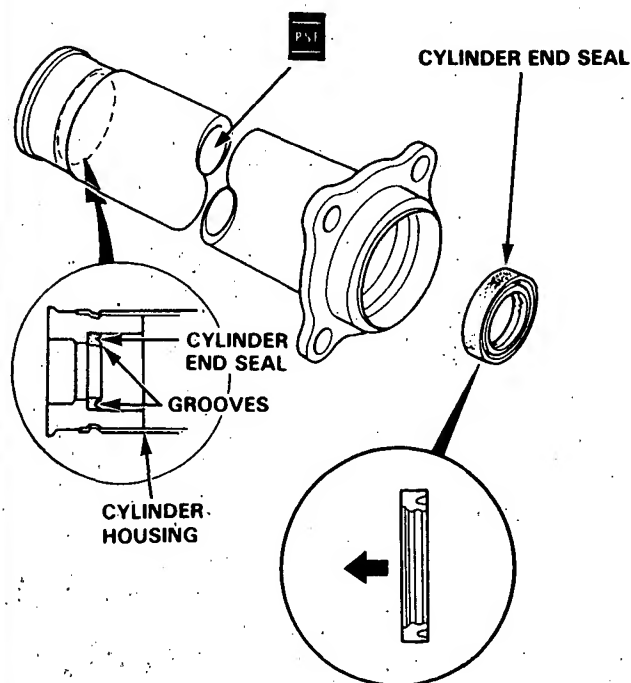


43. Install the cylinder spring over the rack, then coat the rack-bushing A with power steering fluid and install it on the spring.

44. Wrap the end of the steering rack with vinyl tape or use the special tool. Coat the tape or tool with grease.



45. Coat the inside surface of the cylinder with power steering fluid and install the cylinder end seal with its grooved side facing out.



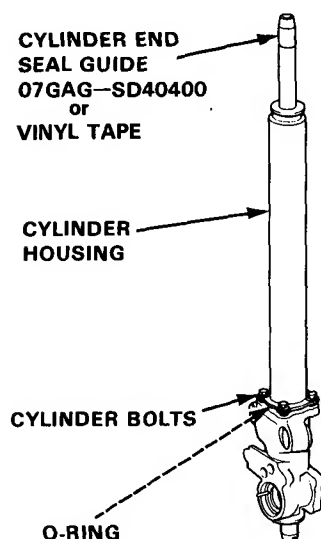


46. Install the O-ring and back-up ring on the gear housing.

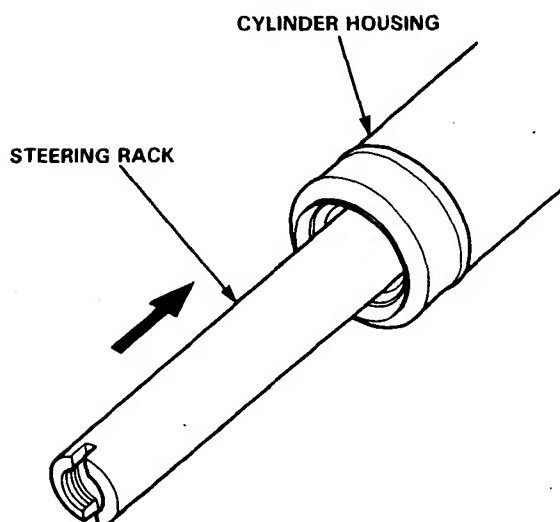
47. Carefully position the cylinder on the gear housing and loosely install with four cylinder bolts.

**CAUTION:** Be careful not to damage the end seal in the cylinder housing.

48. Remove the vinyl tape or special tool from the steering rack.

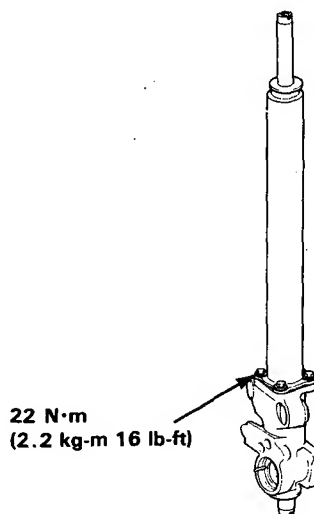


49. Insert the steering rack into the cylinder housing, being careful not to damage the steering rack sliding surface.

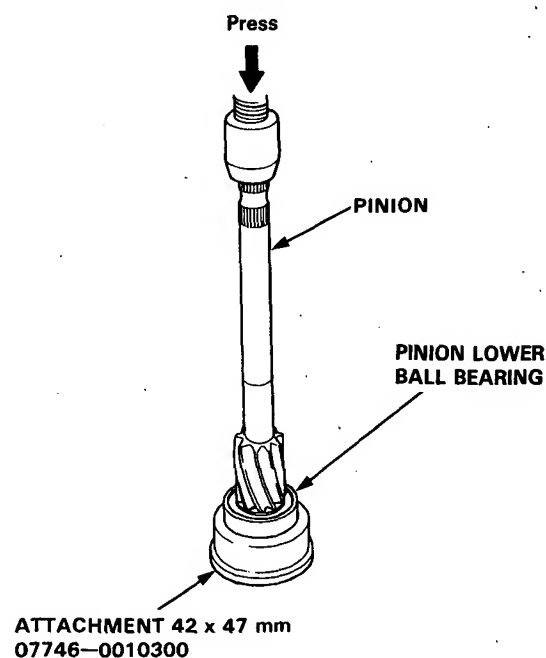


50. Tighten the four cylinder bolts.

**NOTE:** Before tightening the bolts, make sure the mating surfaces of the cylinder and gear housings fit properly by pushing them together; hold them together while tightening the bolts.



51. Using a press and the special tool, install the pinion lower ball bearing on the pinion.

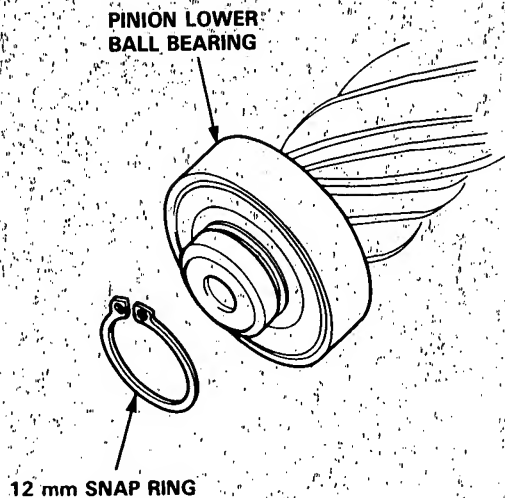


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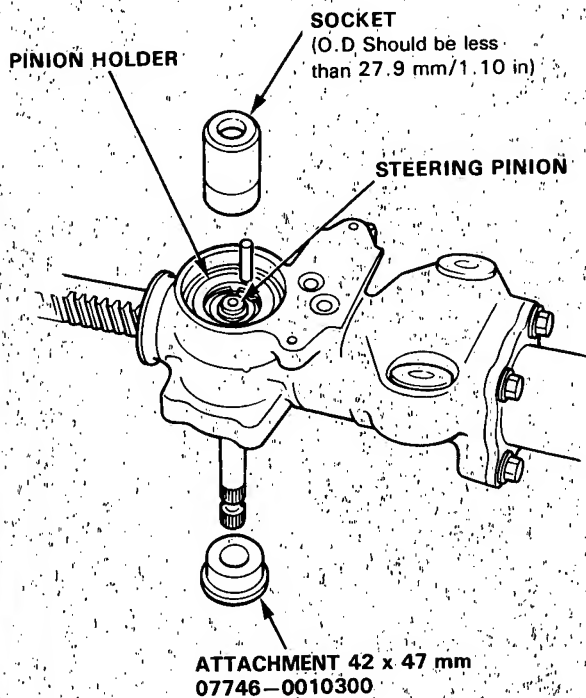
# Steering Gearbox

## Overhaul (cont'd)

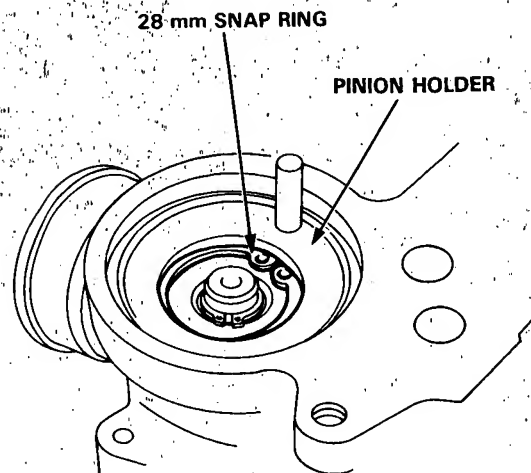
52. Check for smooth operation. Install the 12 mm snap ring.



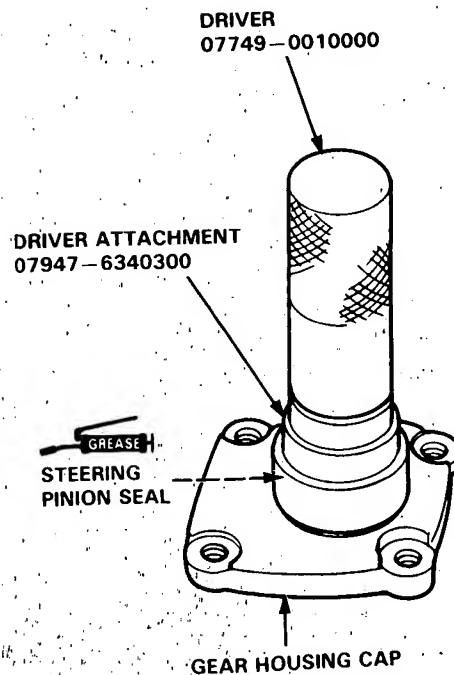
53. Install the steering pinion into the pinion holder using the socket and special tool as shown.



54. Install the 28 mm snap ring securely in the pinion holder groove.



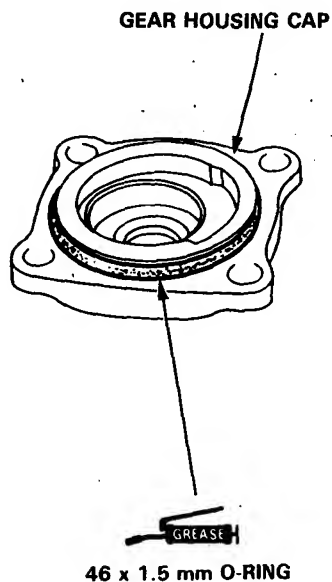
55. Grease the steering pinion seal, and install it on the gear housing cap using the special tools.



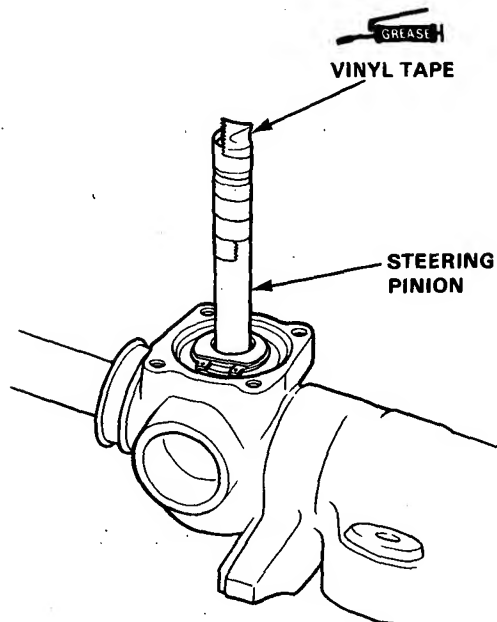




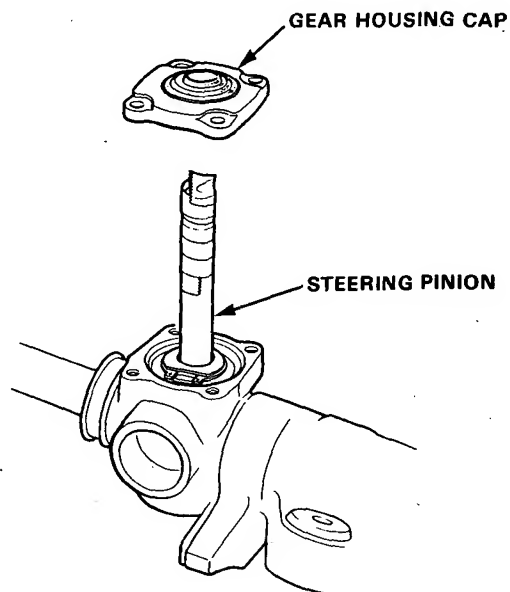
56. Grease the new O-ring and install it in the groove in the gear housing cap.



57. Wrap the splined area of the steering pinion with vinyl tape and grease the surface of the tape.

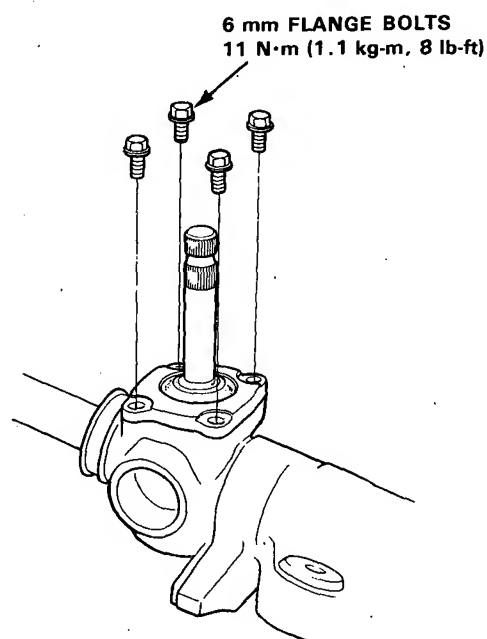


58. Install the gear housing cap carefully to avoid damaging or distorting the lip of the seal or the seal spring.



59. Remove the vinyl tape.

60. Tighten the four 6 mm flange bolts.

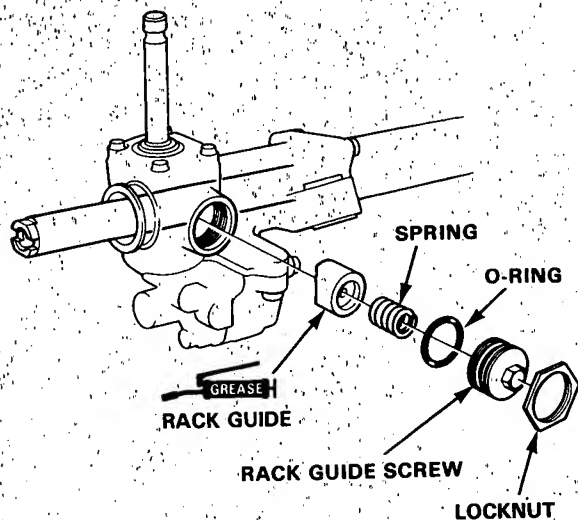


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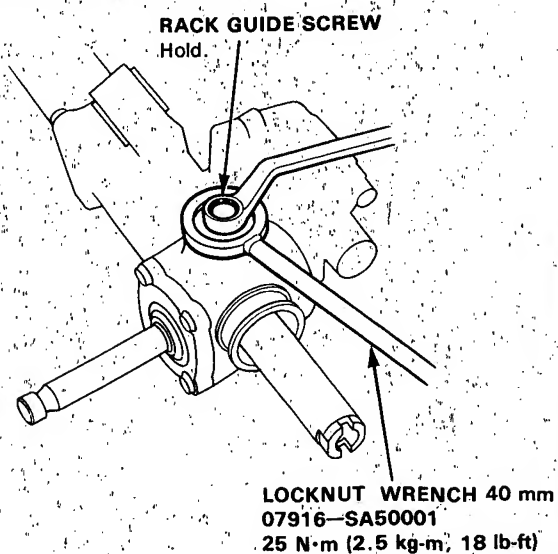
# Steering Gearbox

## Overhaul (cont'd)

61. Install the O-ring on the rack guide screw.
62. Coat the rack guide with grease.
63. Install the rack guide, spring and rack guide screw on the gear housing.
64. Install the valve body unit (see page 17-45).



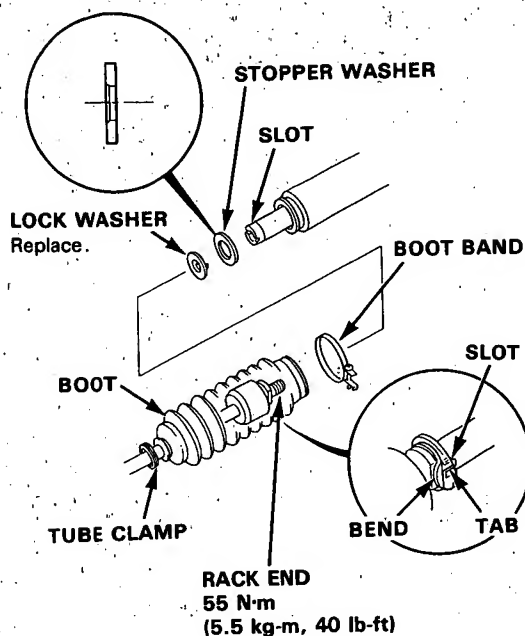
65. Tighten the rack guide screw until it compresses the spring and seats against the rack guide, then loosen it.
66. Retighten it to  $4 \text{ N}\cdot\text{m}$  ( $0.4 \text{ kg}\cdot\text{m}$ ,  $2.9 \text{ lb}\cdot\text{ft}$ ), back it off about  $20^\circ \pm 5^\circ$  and install the locknut on the rack guide screw.
67. Tighten the locknut while holding the rack guide screw with the special tool.



68. Screw each rack end into the rack while holding the lock washer so its tabs are in the slots in the rack.

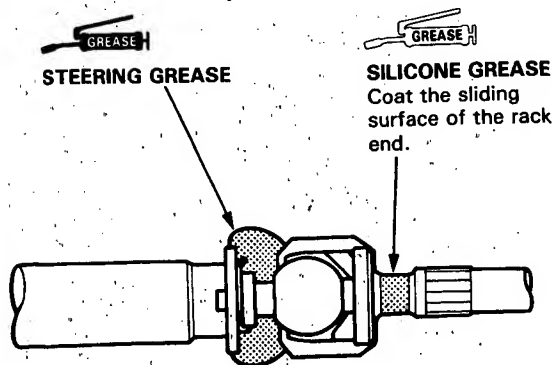
NOTE: Install the stopper washer with the chamfered side facing side.

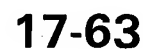
69. Hold the steering rack with a wrench and tighten the rack end to  $55 \text{ N}\cdot\text{m}$  ( $5.5 \text{ kg}\cdot\text{m}$ ,  $40 \text{ lb}\cdot\text{ft}$ ). Then bend the lock washer back against the flat on the flange as shown.



### NOTE:

- Apply grease to the circumference of the rack end ball joint.
- Coat the groove of the rack end and inside of the boot with the silicone grease.

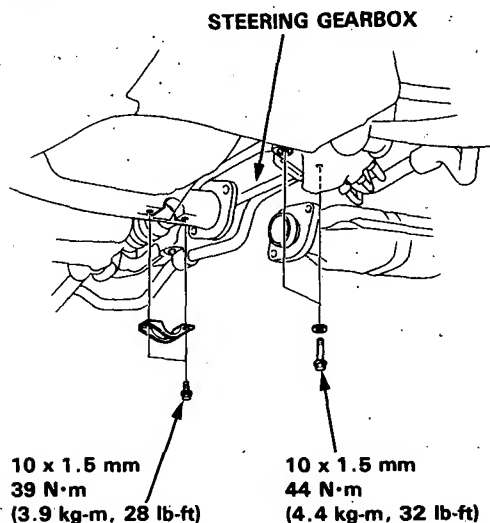




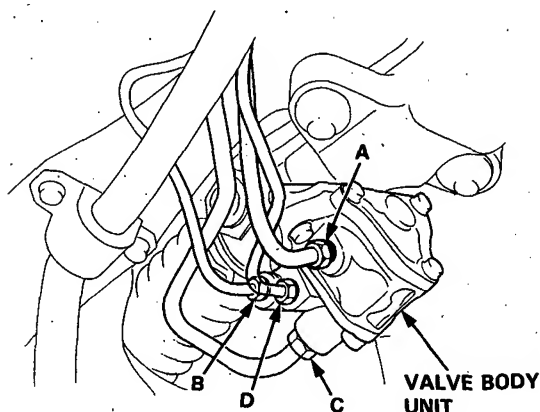
# Steering Gearbox

## Installation

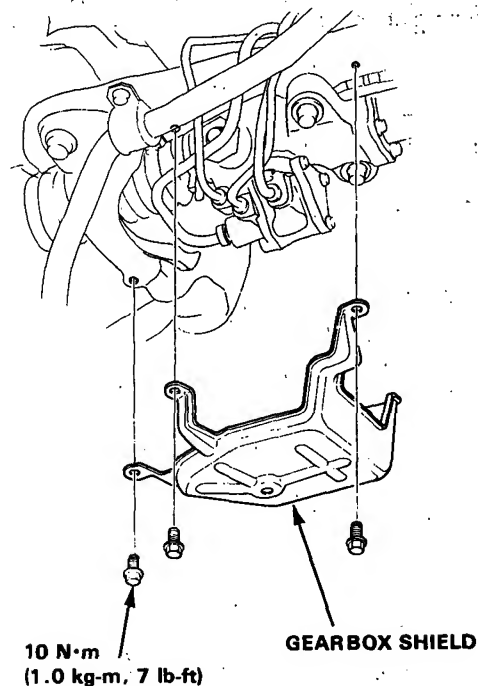
1. Slide the rack all the way to the right.
2. Pass the right side of the steering gearbox assembly above and through the right side of the rear beam.
3. Raise the left side of the steering gearbox assembly above and through the left side of the rear beam.
4. Insert the pinion shaft up through the bulkhead.
5. Install and tighten the steering gearbox mounting bolts.



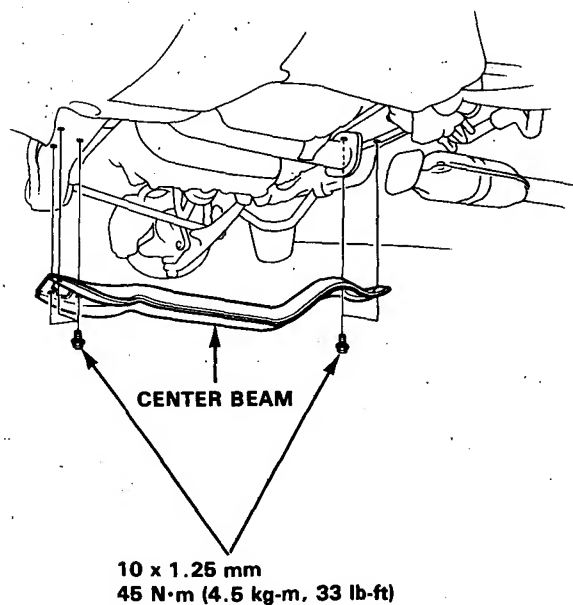
6. Connect the fluid lines to the valve body unit.
  - A: From pump: 14 mm wrench  
38 N·m (3.8 kg-m, 28 lb-ft)
  - B: To reservoir: 12 mm wrench  
13 N·m (1.3 kg-m, 9 lb-ft)
  - C: To oil cooler: 17 mm wrench  
29 N·m (2.9 kg-m, 20 lb-ft)
  - D: To power steering speed sensor: 12 mm wrench  
13 N·m (1.3 kg-m, 9 lb-ft)



7. Install the gearbox shield.



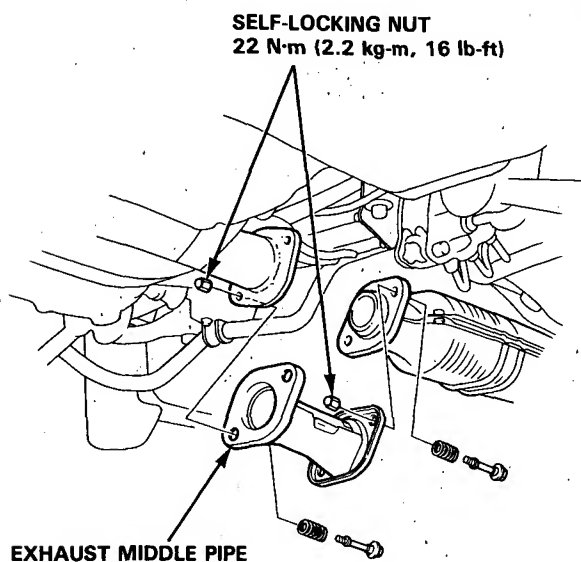
8. Install the center beam.





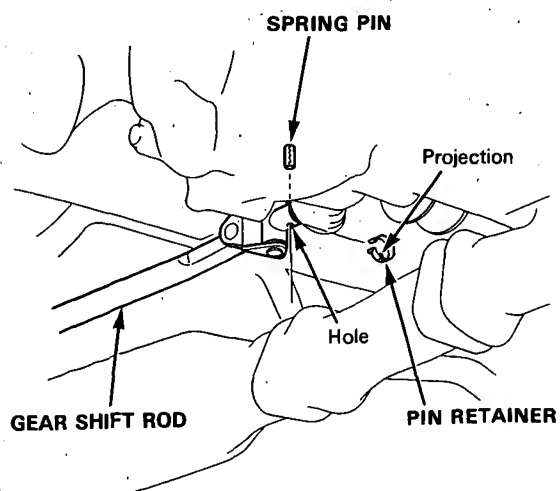
9. Install the exhaust middle pipe with new gasket, and tighten the new self-locking nuts.

NOTE: Tighten the self-locking nuts in steps, alternating side-to-side.

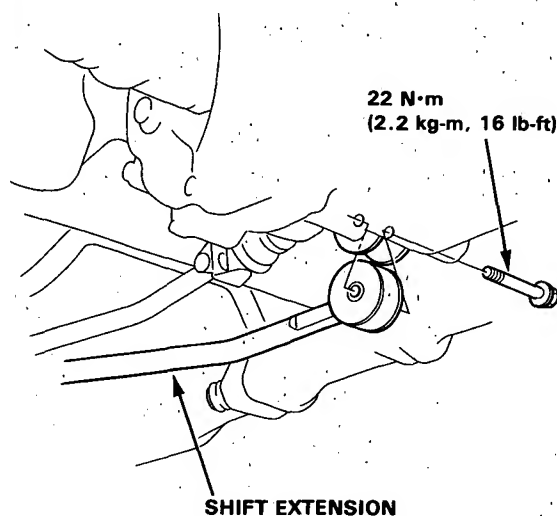


(Manual transmission model:)

- Connect the gear shift rod to the transmission and drive the spring pin with a punch, then install the pin retainer. Be sure that the projection on the pin retainer is in the hole.



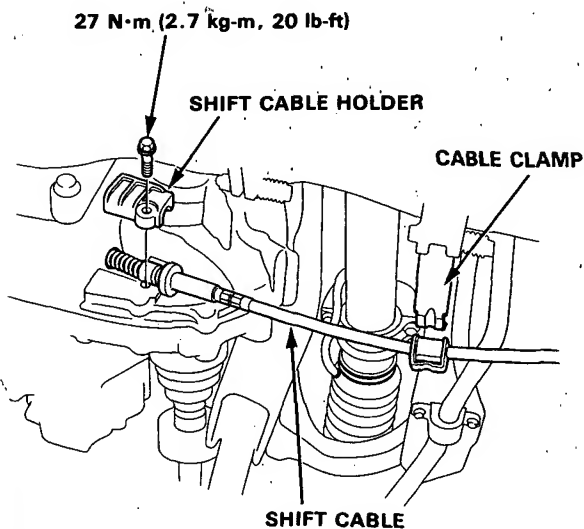
- Install the shift extension to the transmission case.



(Automatic transmission model:)

- Connect the shift cable to the transmission and install the shift cable holder.

NOTE: Secure the shift cable with the cable clamp.



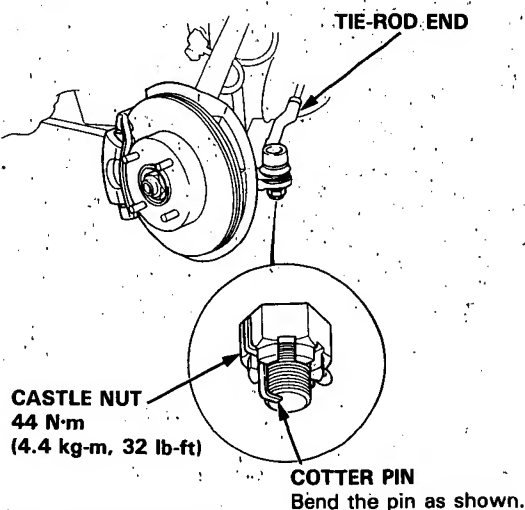
(cont'd)

# Steering Gearbox

## Installation (cont'd)

10. Reconnect the tie-rod ends to the steering knuckles, tighten the castle nut to the specified torque, and install new cotter pins.

**CAUTION:** Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align nut by loosening.



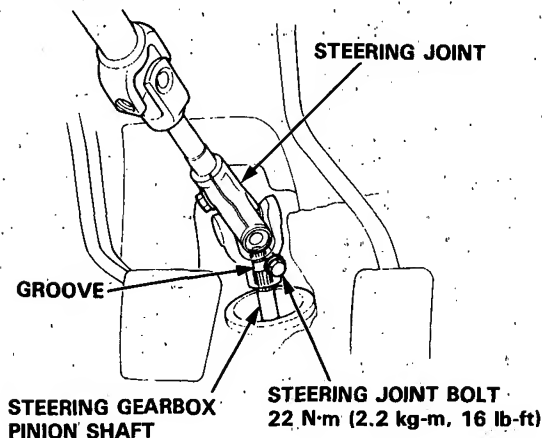
11. Center the steering rack.

12. Slip the lower end of the steering joint onto the steering gearbox pinion shaft (line up the bolt hole with the groove around the shaft), then install and tighten the steering joint bolt.

**NOTE:**

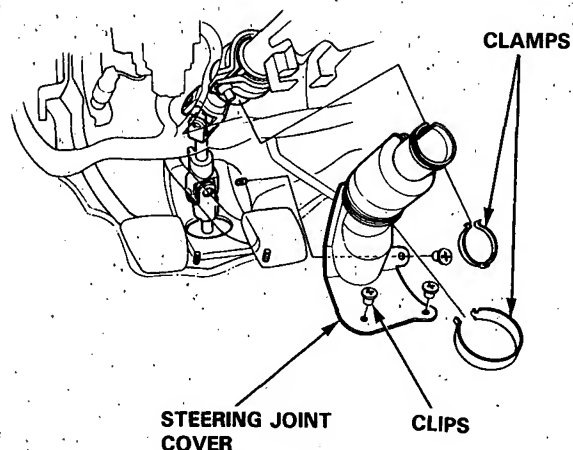
- Be sure that the steering joint bolt is securely in the groove on the steering gearbox pinion shaft.
- Be sure the pinion shaft and steering wheel angle are aligned the steering joint should slip in freely.

If not, reposition the steering rack to correct the misalignment.



13. Adjust the front toe (see section 18).

14. Install the steering joint cover with the clamps and clips.



15. Fill the system:

- Fill the reservoir with new recommended power steering fluid (see page 17-18).
- Steering wheel from lock-to-lock several times to bleed air from the system.
- Check the fluid again, and add more if necessary.

16. Check the gearbox for leaks.

17. Reinstall the front wheels.

## Suspension

**Special Tools** .....18-2

### Component Location

Index .....18-3

### Wheel Alignment

Caster .....18-4

Camber .....18-4

Front Toe Inspection/  
Adjustment .....18-5

Rear Toe Inspection/  
Adjustment .....18-5

Turning Angle Inspection/  
Adjustment .....18-6

### Wheel Measurements

Bearing End Play .....18-7

Runout .....18-7

### Front Suspension

Torque Specification .....18-8

Illustrated Index .....18-9

Knuckle/Hub Replacement .....18-11

Lower Ball Joint  
Replacement .....18-16

Upper Arm Bushing  
Replacement .....18-17

### Front Damper

Removal .....18-18

Disassembly/Inspection .....18-18

Reassembly .....18-20

Installation .....18-20

### Rear Suspension

Torque Specification .....18-21

Illustrated Index .....18-22

Upper Arm Bushing  
Replacement .....18-23

Compensator Arm Bushing  
Replacement .....18-23

Hub Unit Bearing  
Replacement .....18-24

### Rear Damper

Removal .....18-24

Disassembly .....18-25

Inspection .....18-25

Reassembly .....18-27

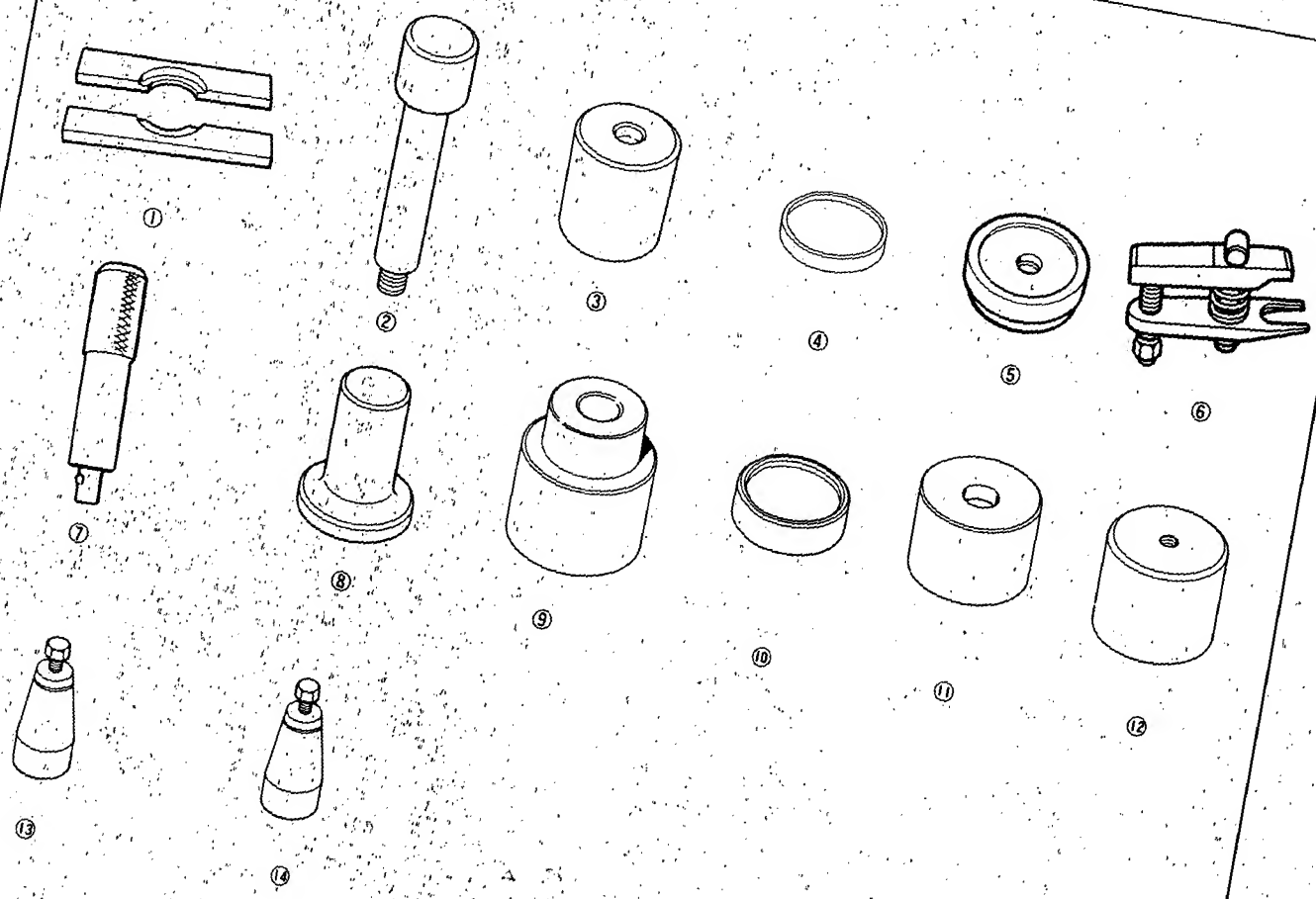
Installation .....18-27

**Damper Disposal** .....18-28



# Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAF-SD40700	Hub Dis/Assembly Base	2	18-13, 18-14
②	07GAF-SE00100	Hub Dis/Assembly Tool	1	18-13, 18-14, 18-15
③	07GAF-SE00200	Hub Assembly Guide Attachment	1	18-15
④	07GAF-SE00401	Hub Dis/Assembly Base	1	18-14
⑤	07HAD-SF10100	Bearing Driver Attachment	1	18-14
⑥	07MAC-SL00200	Ball Joint Remover, 28 mm Driver	1	18-12, 18-13
⑦	07749-0010000	Oil Seal Driver	1	18-14, 18-15
⑧	07947-6340000	Ball Joint Remover/Installer	1	18-14
⑨	07965-SB00100	Ball Joint Installer Base	1	18-16
⑩	07965-SB00200	Ball Joint Remover Base	1	18-16
⑪	07965-SB00300	Hub Dis/Assembly Base	1	18-14, 18-15
⑫	07965-6920201	Ball Joint Boot Clip Guide	1	18-16
⑬	07974-SA50700	Ball Joint Boot Clip Guide	1	18-16
⑭	07974-SA50800	Ball Joint Boot Clip Guide	1	18-9





# Component Location

## Index



**⚠ WARNING** The front and rear dampers contain nitrogen gas and oil under pressure. The pressure must be relieved before disposal to prevent explosion and possible injury when scrapping.

Wheel Alignment, page 18-4

### Front Suspension:

#### FRONT DAMPER

- Removal, page 18-18
- Disassembly/Inspection, page 18-18
- Reassembly, page 18-20
- Installation, page 18-20
- Disposal, page 18-28

#### UPPER ARM

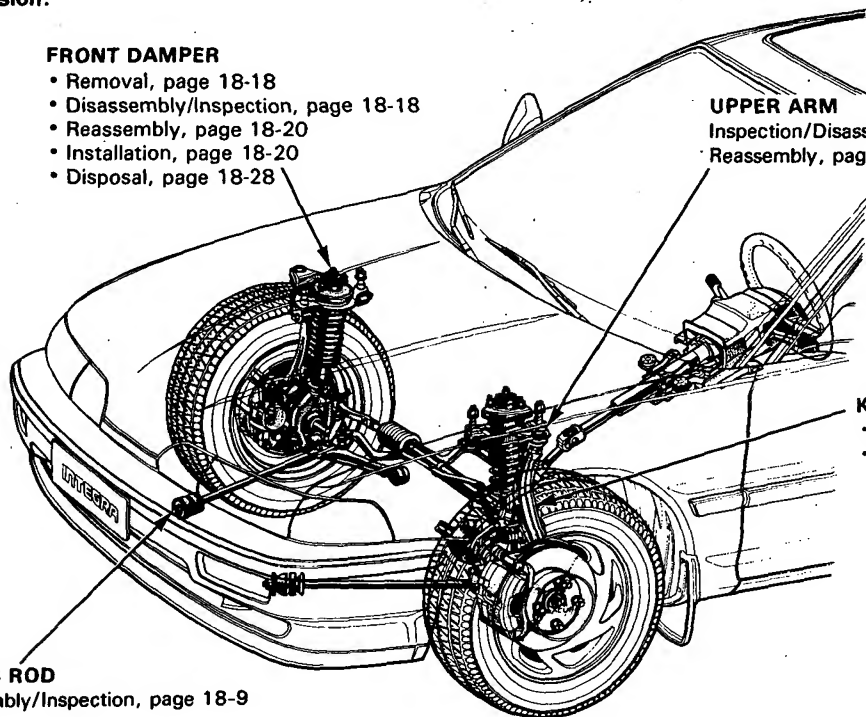
- Inspection/Disassembly/Reassembly, page 18-9

#### KNUCKLE/HUB

- Replacement, page 18-11
- Bearing Replacement, page 18-14

#### RADIUS ROD

- Disassembly/Inspection, page 18-9



### Rear Suspension:

#### REAR UPPER ARM

- Disassembly/Inspection, page 18-22

#### REAR DAMPER

- Removal, page 18-24
- Disassembly/Inspection, page 18-25
- Reassembly/Installation, page 18-27
- Disposal, page 18-28

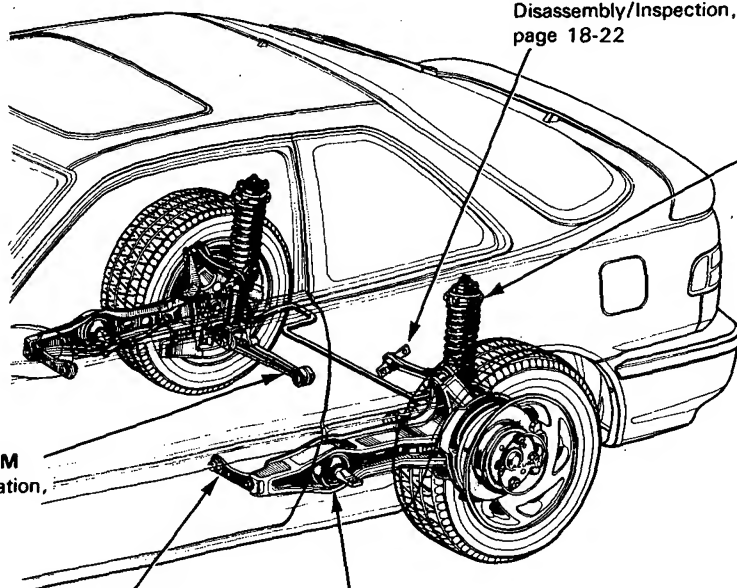
#### REAR LOWER ARM

- Disassembly/Installation, page 18-22

- COMPENSATOR ARM  
Inspection, page 18-22

#### TRAILING ARM

- Disassembly/Inspection, page 18-22

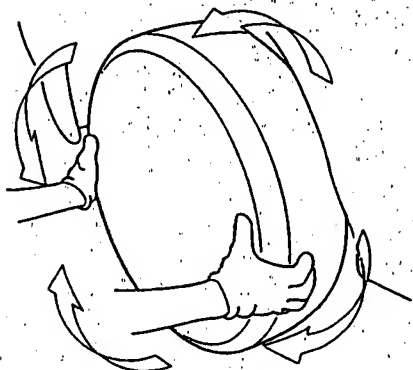


# Wheel Alignment

## Caster

**NOTE:** For proper inspection/adjustment of the wheel alignment, check and adjust the following before checking the alignment.

- Check that the suspension is not modified.
- Check the tire size and tire pressure.
- Check the runout of the wheels and tires.
- Check the suspension ball joints. (Hold a wheel with your hands and move it up and down and right and left to check for wobbling.)



### Inspection

**NOTE:** Use commercially available computerized four wheel alignment equipment to measure wheel alignment (i.e. toe, turning angle, camber, and/or caster). Follow the equipment manufacturer's instructions.

1. Check the steering wheel angle; If significantly off center, it may be necessary to remove the steering wheel and reposition it on the splines. Turn the steering wheel to the straight ahead position.
2. Check the caster angle.

**Caster angle:**  $1^{\circ}30' \pm 1^{\circ}$

3. Is out of specification, check for damaged suspension components.

## Camber

### Inspection

**NOTE:** Use commercially available computerized four wheel alignment equipment to measure wheel alignment (i.e. toe, turning angle, camber, and/or caster). Follow the equipment manufacturer's instructions.

1. Check the tire pressure.
2. Check the steering wheel angle. If significantly off center, it may be necessary to remove the steering wheel and reposition it on the splines. Turn the steering wheel to the straight ahead position.
3. Check the camber angle.

**Camber angle, Front:**  $0^{\circ}00' \pm 1^{\circ}$   
**Rear:**  $-0^{\circ}40' \pm 1^{\circ}$

4. If out of specification, check for damaged suspension components.



## Front Toe Inspection/Adjustment

**NOTE:** Use commercially available computerized four wheel alignment equipment to measure wheel alignment (i.e. toe, turning angle, camber, and/or caster). Follow the equipment manufacturer's instructions.

1. Check the tire pressure.
2. Center steering wheel spokes.
3. Check the toe with the wheels pointed straight ahead.

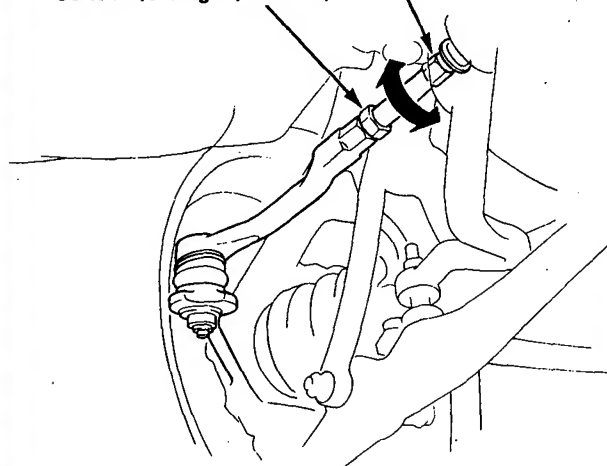
**Front toe:**  $0 \pm 2.0 \text{ mm}$  ( $0 \pm 0.08 \text{ in}$ )

- If adjustment is required, go on to step 4.
  - If no adjustment is required, remove alignment equipment.
4. Loosen the tie-rod locknuts and turn both tie-rods in the same direction until the front wheels are in the straight ahead position.
  5. Turn both tie-rods equally until the toe reading on the turning radius gauge is correct.
  6. After adjusting, tighten the tie-rod locknuts.

**NOTE:** Reposition the tie-rod boot if it is twisted or displaced.

**TIE-ROD LOCKNUT**  
14 x 1.5 mm  
55 N·m (5.5 kg-m, 40 lb-ft)

**TIE-ROD**



## Rear Toe Inspection/Adjustment

**NOTE:** Use commercially available computerized four wheel alignment equipment to measure wheel alignment (i.e. toe, turning angle, camber, and/or caster). Follow the equipment manufacturer's instructions.

1. Release parking brake.

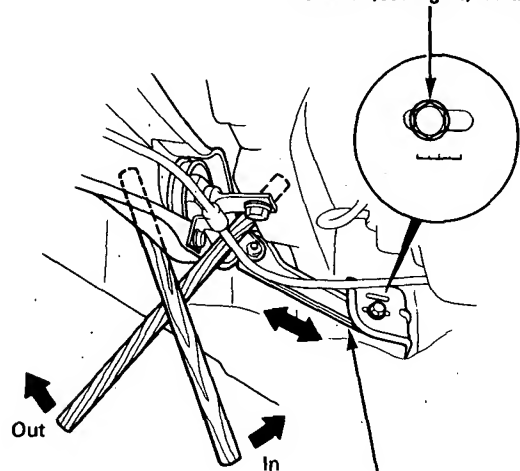
**NOTE:**

- Measure difference in toe measurements with the wheels pointed straight ahead.
- If the parking brake is engaged, you may get an incorrect reading.

**Rear toe-in:**  $2.0 \pm \frac{1.0}{2.0} \text{ mm}$  ( $0.08 \pm \frac{0.04}{0.08} \text{ in}$ )

- If adjustment is required, go to step 2.
  - If no adjustment is required, remove alignment equipment.
2. Before adjustment, note the locations of right and left compensator arm adjusting bolts.
  3. Loosen the adjusting bolt and slide the compensator arm in or out as shown, to adjust the toe.
  4. Tighten the adjusting bolt.

**ADJUSTING BOLT**  
10 x 1.25 mm  
65 N·m (6.5 kg-m, 47 lb-ft)



**COMPENSATOR ARM**

● **Example**

- After the rear toe inspection, the wheel is 2.0 mm (0.08 in) out of the specification.
- Move the arm so the adjusting bolt moves 2.0 mm (0.08 in) inward from the position recorded before the adjustment.
  - The distance the adjusting bolt is moved should be equal to the amount out-of-specification.

# Wheel Alignment

## Turning Angle Inspection/Adjustment

NOTE: Use commercially available computerized four wheel alignment equipment to measure wheel alignment (i.e. toe, turning angle, camber, and/or caster). Follow the equipment manufacturer's instructions.

1. Jack up the front of the car. Set the turning radius gauges beneath the front wheels, then lower the car.
2. Jack up the rear of the car. Place boards that are the same thickness as the turning radius gauges under the rear wheels, then lower the car.

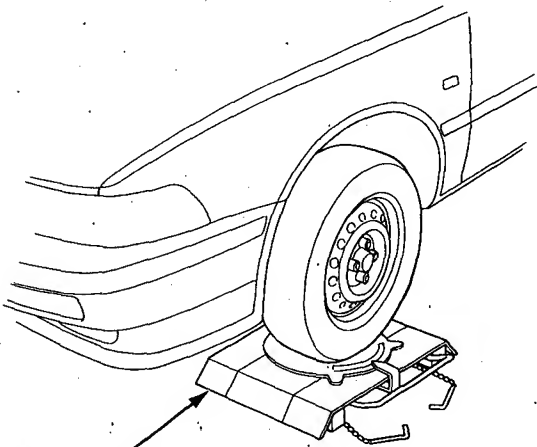
NOTE: For accurate readings, the car must be level.

3. Turn the wheel right and left while applying the brake, and measure the turning angle of both wheels.

Turning angle:

Inward wheel:  $40^{\circ}30' \pm 2^{\circ}$

Outward wheel:  $32^{\circ}00'$  (reference)



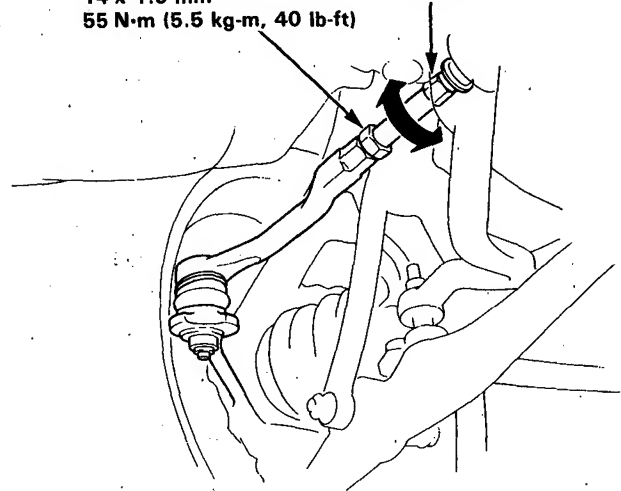
TURNING RADIUS  
GAUGE

4. If the measurements are not within the specifications, adjust as required by turning the tie-rods.

NOTE: After adjusting, recheck the front wheel toe and readjust if necessary. Reposition the tie-rod boot if twisted or displaced.

TIE-ROD LOCKNUT  
14 x 1.5 mm  
55 N·m (5.5 kg-m, 40 lb-ft)

TIE-ROD



# Wheel Measurements

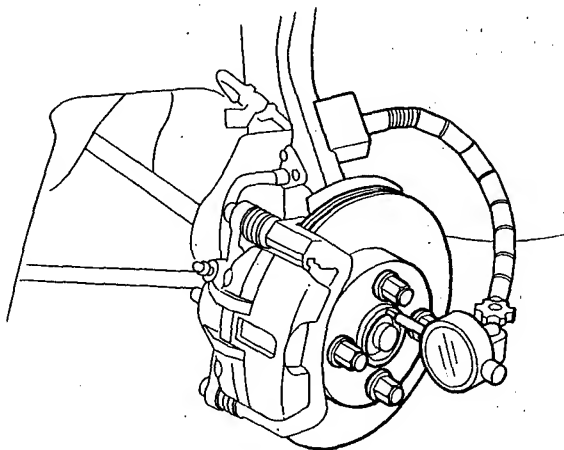


## Bearing End Play

1. Raise the car off the ground and support it with safety stands in the proper locations (see section 1).
2. Remove the wheels, then reinstall the lug nuts.
3. Attach the dial gauge as shown.
4. Measure the bearing end play by moving the disc in and out.

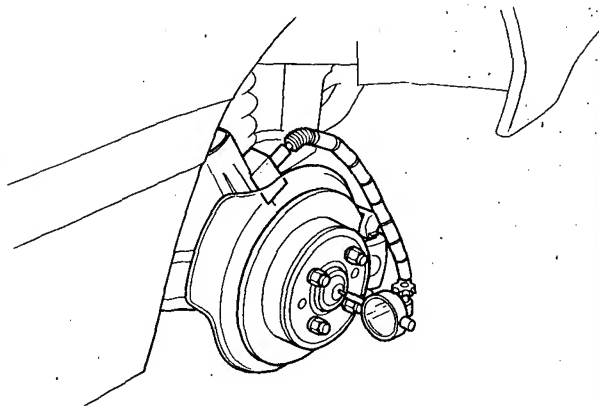
### Front Wheel End Play:

Standard: 0–0.05 mm (0–0.002 in)



### Rear Wheel End Play:

Standard: 0–0.05 mm (0–0.002 in)



5. If the bearing end play measurement is more than the standard, replace the wheel bearing.

## Runout

1. Raise the car off the ground and support it with safety stands in the proper locations (see section 1).
2. Check for bent or deformed wheels.
3. Attach the dial gauge as shown.
4. Measure the wheel runout by turning the wheel.

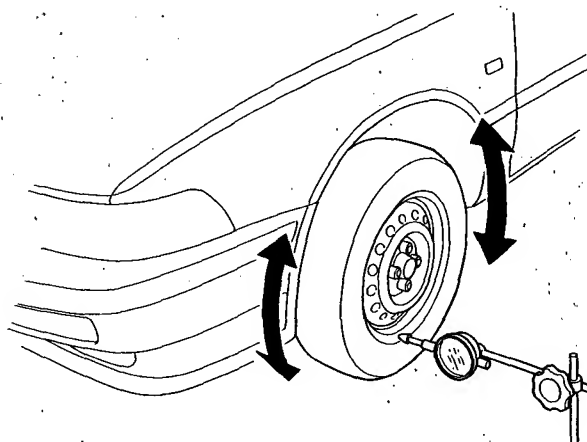
### Front and Rear Wheel Axial Runout:

#### Standard:

Steel Wheel: 0–1.0 mm (0–0.04 in)

Aluminum Wheel: 0–0.7 mm (0–0.03 in)

Service limit: 2.0 mm (0.08 in)



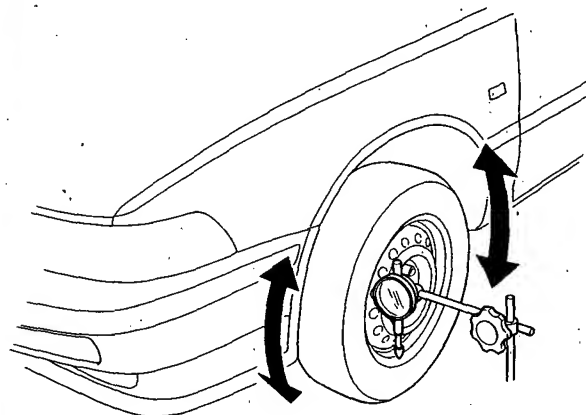
### Front and Rear Wheel Radial Runout:

#### Standard:

Steel Wheel: 0–1.0 mm (0–0.04 in)

Aluminum Wheel: 0–0.7 mm (0–0.03 in)

Service limit: 1.5 mm (0.06 in)



5. If the wheel runout is more than the service limit, replace the wheel.

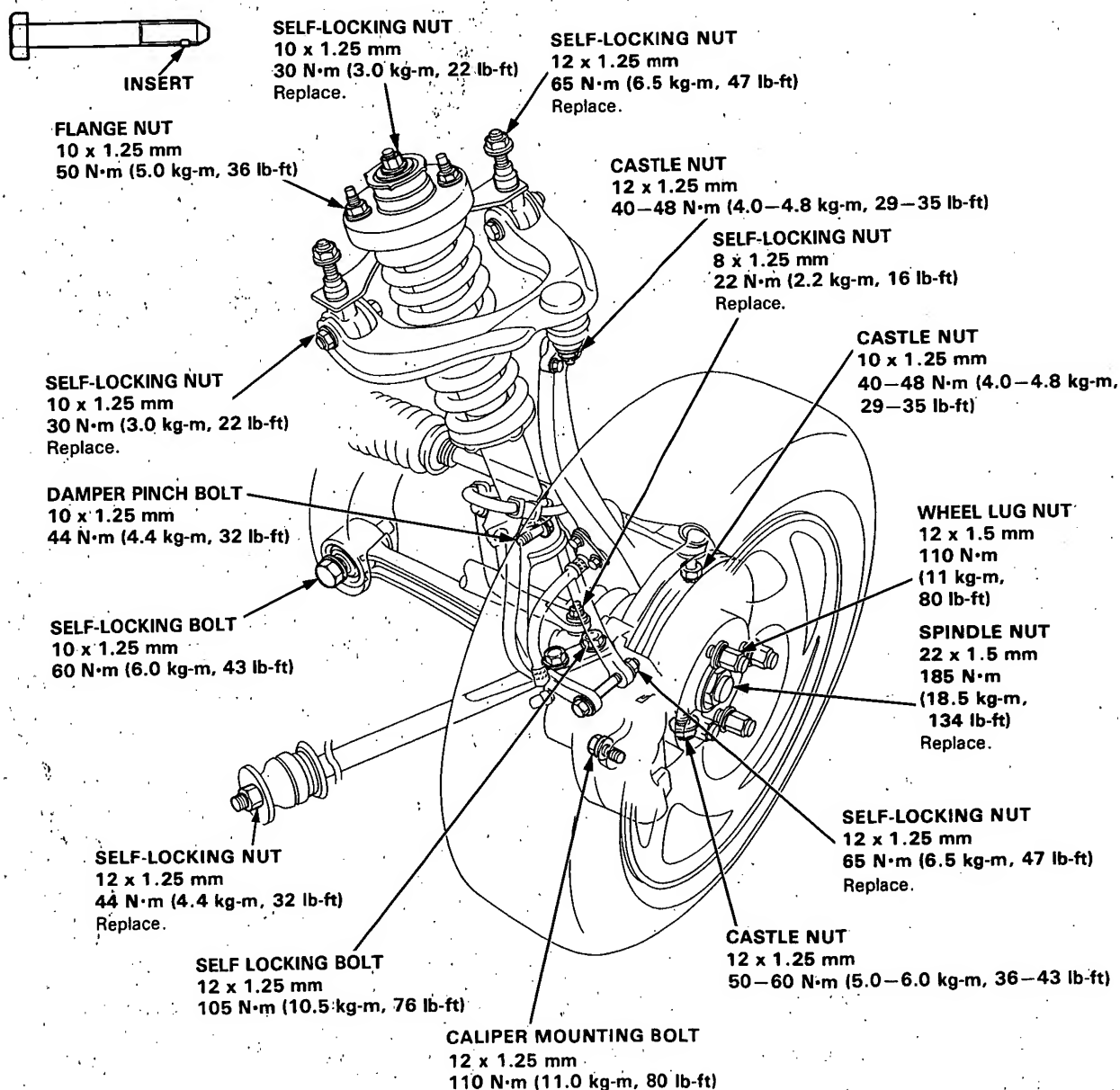
# Front Suspension

## Torque Specifications

### CAUTION:

- Replace the self-locking nuts after removal.
- Replace the self-locking bolts if you can easily thread a non-self-locking nut past their nylon locking inserts. (It should require 1 N·m (0.1 kg-m, 0.7 lb-ft) of torque to turn the nut on the bolt).
- The vehicle should be on the ground before any bolts or nuts connected to rubber mounts or bushing are tightened.
- Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.

NOTE: Wipe off the grease on the threads before tightening the fasteners.





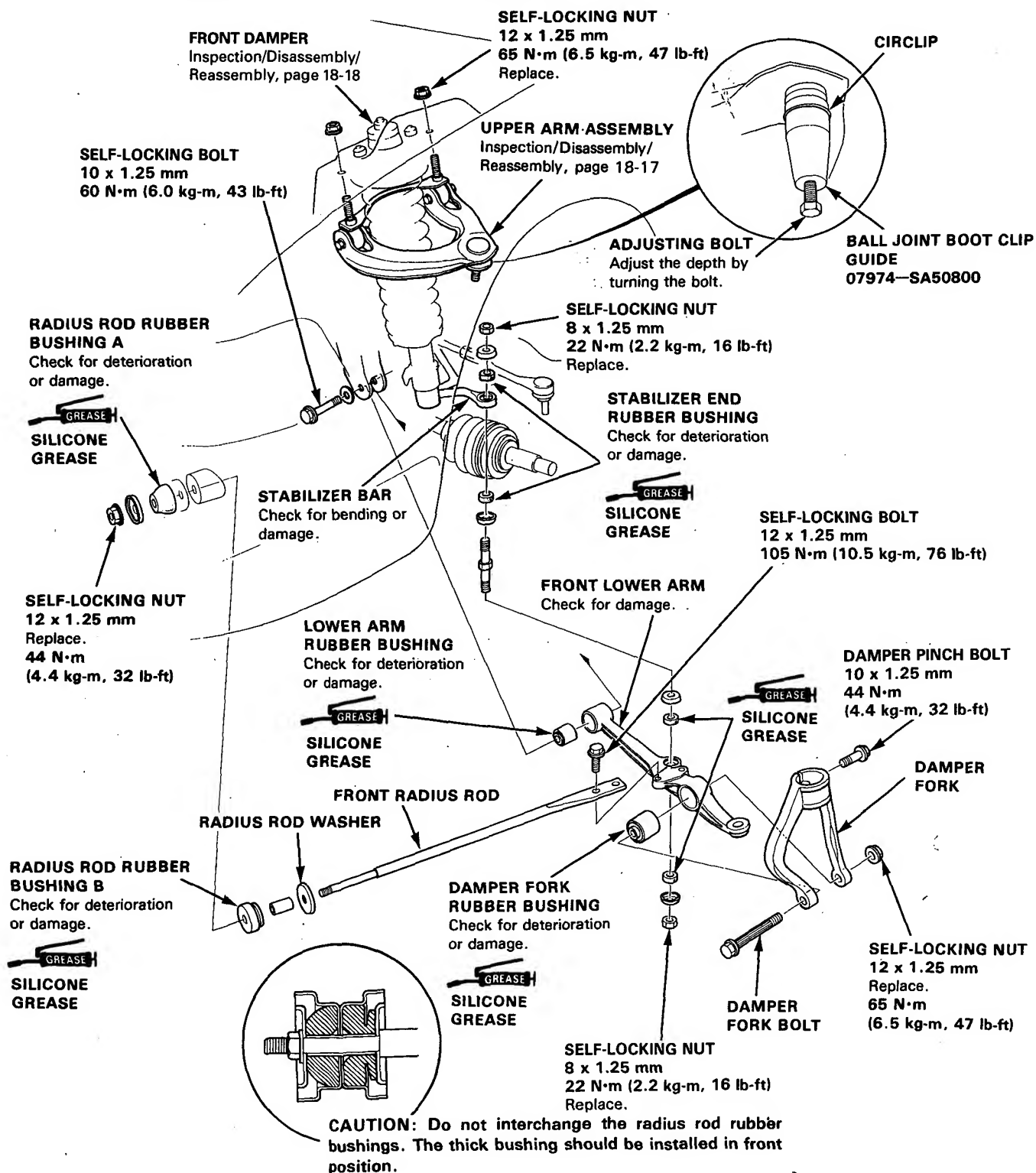
## Illustrated Index

### Overall Suspension

#### CAUTION:

- Replace the self-locking nuts after removal.
- Replace the self-locking bolts if you can easily thread a non-self locking nut past their nylon locking inserts.  
(It should require 1 N·m (0.1 kg-m, 0.7 lb-ft) of torque to turn the test nut on the bolt).

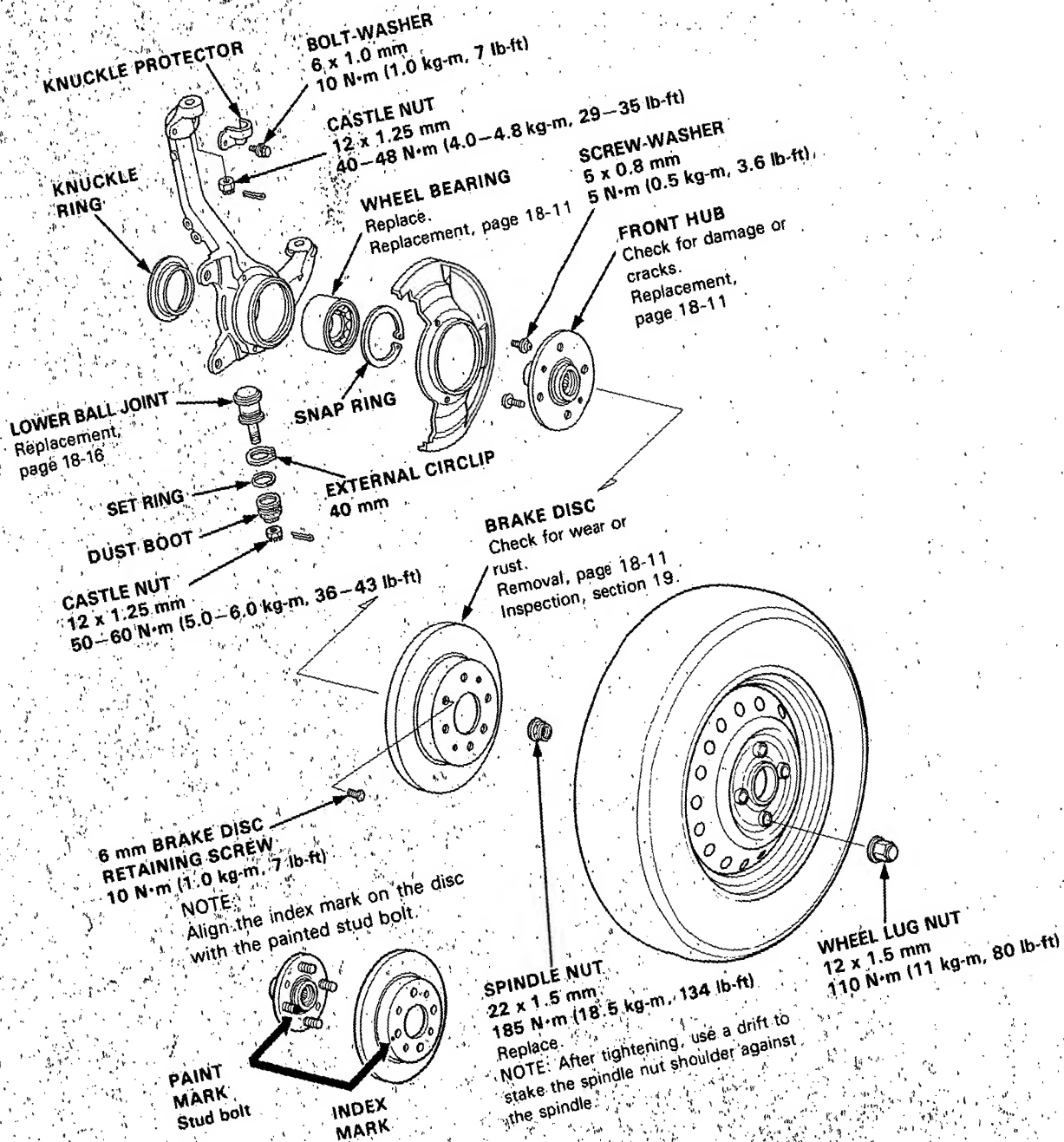
NOTE: Wipe off the grease before tightening the nut at the ball joint.



# Front Suspension Knuckle/Hub

## NOTE

- Use only genuine Honda wheel weights for aluminum wheels. Non-genuine wheel weights may corrode and damage the aluminum wheels.
- Remove the center cap by prying it out with a flat screwdriver. Use a rag at the point you are going to pry because aluminum alloy wheels can be easily damaged. Avoid damage to the cap by not allowing it to fall during removal.
- Before installing the brake disc, clean the mating surfaces of the front hub and inside of the brake disc.
- Before installing the wheel, clean the mating surfaces of the brake disc and inside of the wheel.

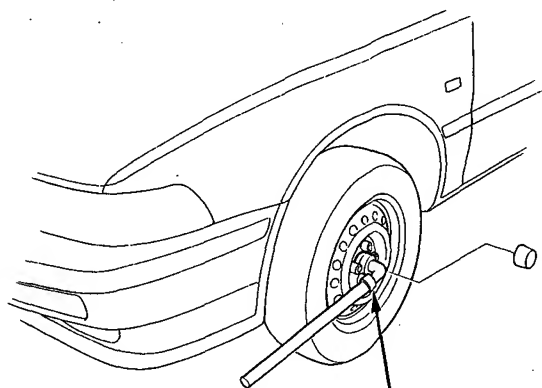






## Knuckle/Hub Replacement

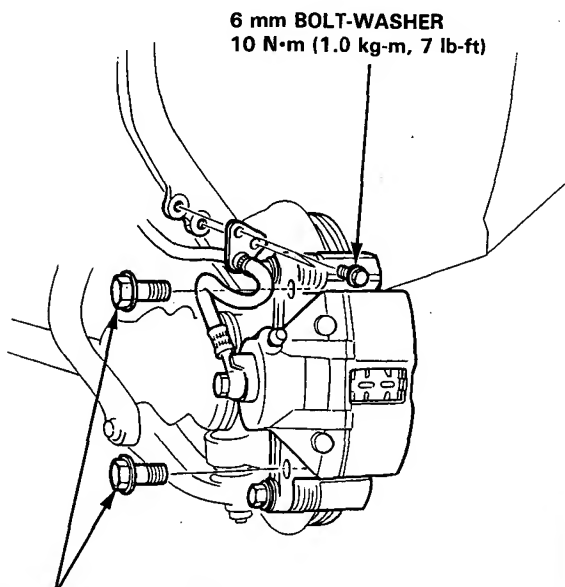
1. Pry the spindle nut stake away from the spindle, then loosen the nut.



**SPINDLE NUT**  
22 x 1.5 mm  
185 N·m (18.5 kg-m, 134 lb-ft)  
Replace.

2. Loosen the wheel lug nuts slightly.
3. Raise the front of car and support on safety stands in proper locations (see section 1).
4. Remove the wheel nuts, wheel, and spindle nut.
5. Remove the caliper mounting bolts and hang the caliper assembly to one side.

**CAUTION:** To prevent accidental damage to the caliper assembly or brake hose, use a short piece of wire to hang the caliper assembly from the undercarriage.

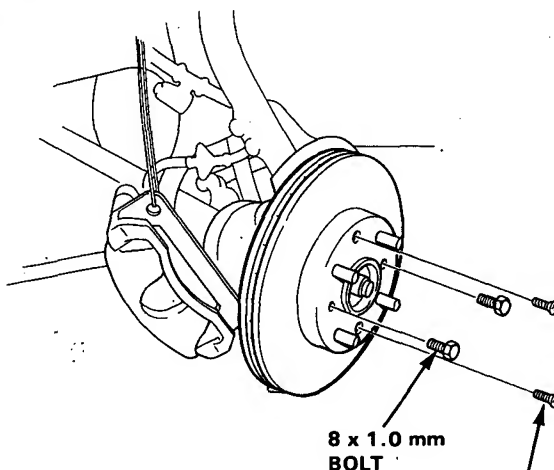


**CALIPER MOUNTING BOLTS**  
12 x 1.25 mm  
110 N·m (11.0 kg-m, 80 lb-ft)

**6 mm BOLT-WASHER**  
10 N·m (1.0 kg-m, 7 lb-ft)

6. Remove the 6 mm brake disc retaining screws.
7. Screw two 8 x 1.0 mm bolts into the disc to push it away from the hub.

**NOTE:** Turn each bolt two turns at a time to prevent cocking disc excessively.



**8 x 1.0 mm  
BOLT**

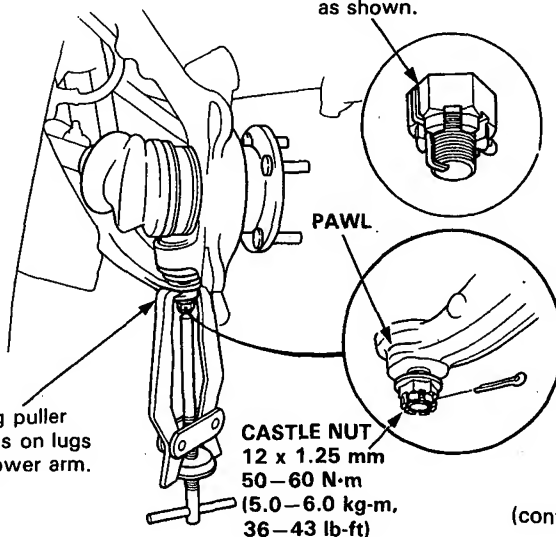
**6 mm BRAKE DISC  
RETAINING SCREW**

8. Remove the cotter pin and loosen the lower arm ball joint nut half the length of the joint threads.
9. Separate the ball joint and lower arm using a puller with the pawls applied to the lower arm.

**CAUTION:** Avoid damaging the ball joint boot.

**NOTE:** If necessary, apply penetrating type lubricant to loosen the ball joint.

**COTTER PIN**  
Replace.  
On reassembly,  
bend the cotter pin  
as shown.



**PAWL**

**CASTLE NUT**  
12 x 1.25 mm  
50–60 N·m  
(5.0–6.0 kg-m,  
36–43 lb-ft)

Hang puller  
pawls on lugs  
on lower arm.

(cont'd)

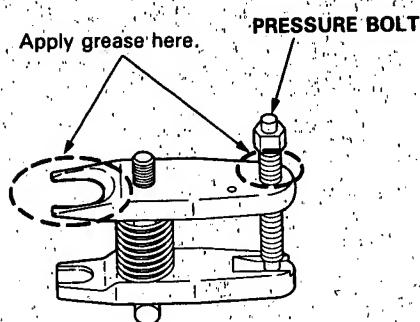
# Front Suspension

## Knuckle/Hub Replacement (cont'd)

**NOTE:** Use ball joint remover to separate the ball joints from the suspension or steering arm.

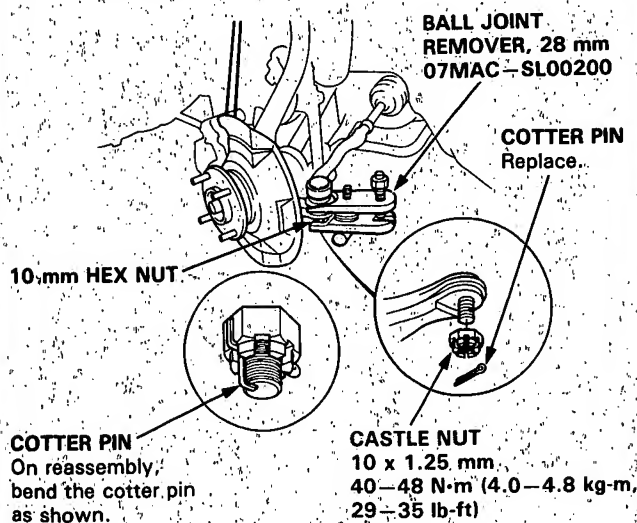
**CAUTION:** Be careful not to damage the ball joint boot.

10. Clean any dirt or grease off the ball joint.
11. Remove the cotter pin from the steering arm and remove the nut.
12. Apply grease to the special tool on the areas shown. This will ease installation of the tool and prevent damage to the pressure bolt threads.

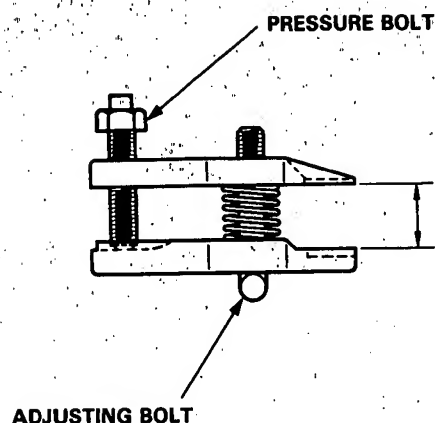


13. Install a 10 mm hex nut on the ball joint. Be sure that the hex nut is flush with the ball joint pin end to prevent damage to the threaded end of the ball joint.
14. Use the ball joint remover as shown. Insert the jaws carefully, making sure you do not damage the ball joint boot. Adjust the jaw spacing by turning the pressure bolt.

**NOTE:** If necessary, apply penetrating type lubricant to loosen the ball joint.



15. Once the tool is in place, turn the adjusting bolt as necessary to make the jaws parallel. Then hand-tighten the pressure bolt and recheck the jaws to make sure they are still parallel.



16. With a wrench, tighten the pressure bolt until the ball joint shaft pops loose from the steering arm.

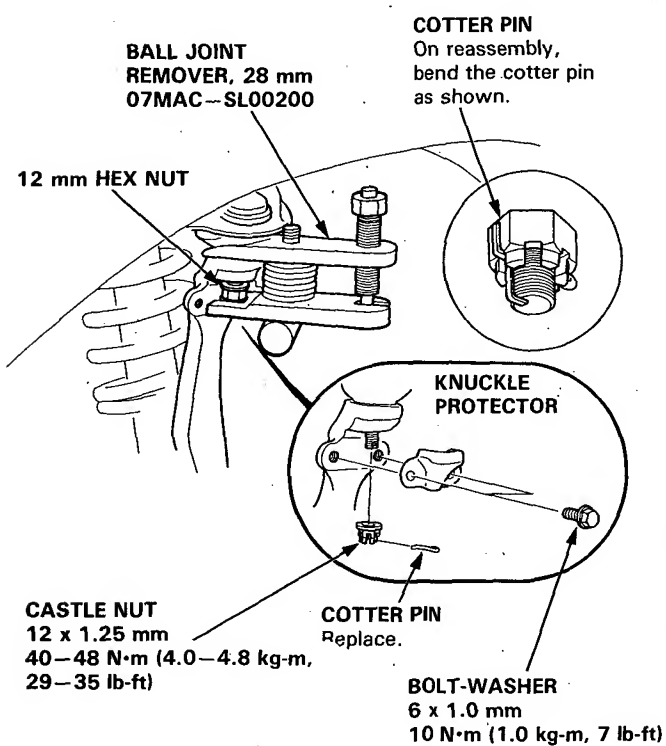
**⚠ WARNING** Wear eye protection. The ball joint can break loose suddenly and scatter dirt or other debris in your eyes.

17. Remove the tool, then remove the nut from the end of the ball joint and pull the ball joint out of the steering/suspension arm. Inspect the ball joint boot and replace it if damaged.



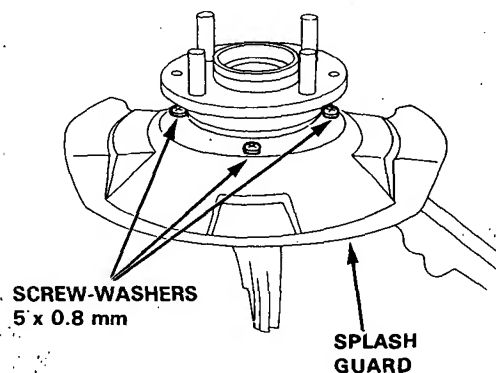
18. Remove the knuckle protector.
19. Remove the cotter pin and the upper ball joint nut.
20. Install a 12 mm hex nut on the ball joint. Be sure that the hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.
21. Use the ball joint remover as shown on page 18-12 to separate the ball joint and knuckle.

**NOTE:** If necessary, apply penetrating type lubricant to loosen the ball joint.



22. Remove the knuckle and hub by sliding them off the driveshaft.

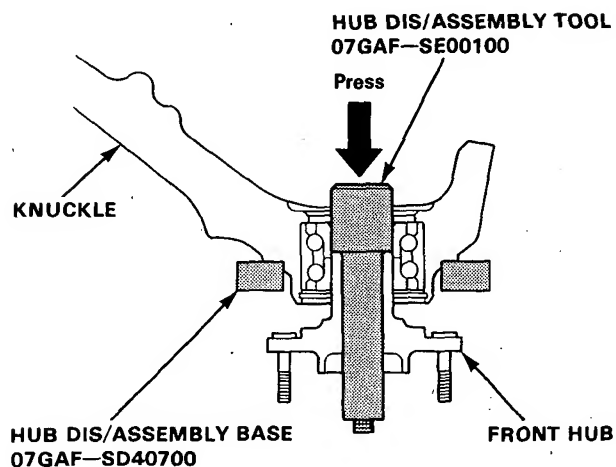
23. Remove the splash guard screw-washers from the knuckle.



24. Separate the hub from the knuckle using the special tools and a press.

**CAUTION:**

- Take care not to distort the splash guard.
- Hold onto the hub to keep it from falling when pressed clear.



(cont'd)

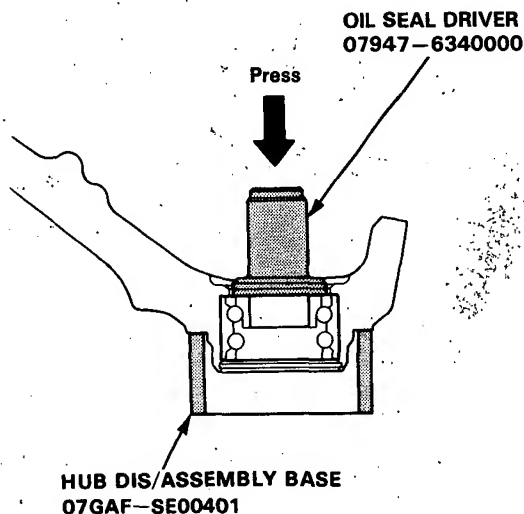
# Front Suspension

## Knuckle/Hub Replacement (cont'd)

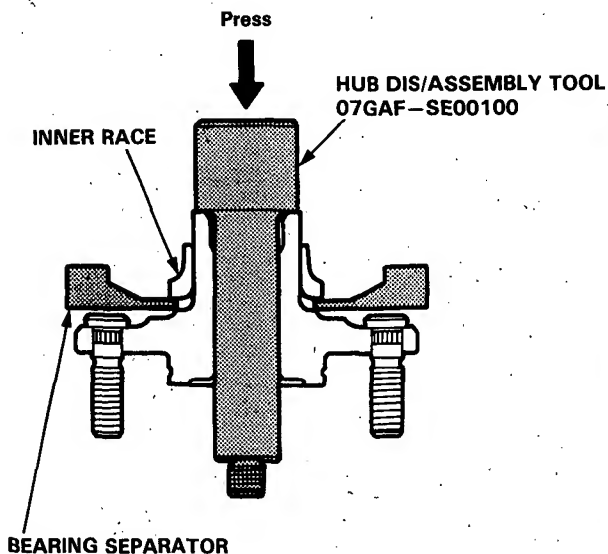
NOTE: Replace the bearing with a new one after removal.

25. Remove the snap ring and knuckle ring from the knuckle.

26. Press the wheel bearing out of the knuckle using the special tools and a press.

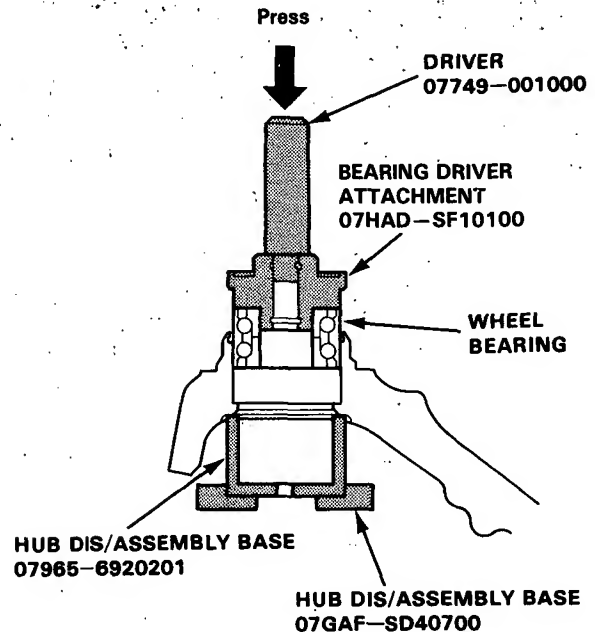


27. Press the wheel bearing inner race from the hub using the special tool and a commercially available bearing separator.

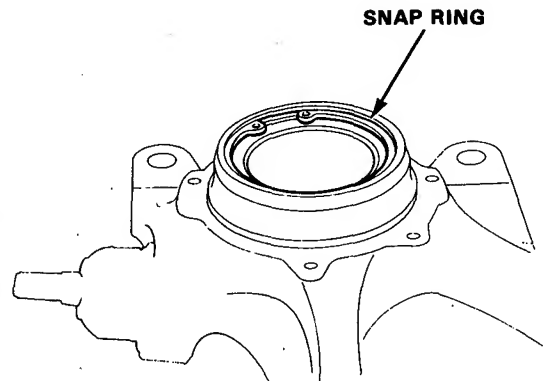


NOTE: Wash the knuckle and hub thoroughly in high flash point solvent before reassembly.

28. Press a new wheel bearing into the hub using the special tools and a press.



29. Install the snap ring securely in the knuckle groove.

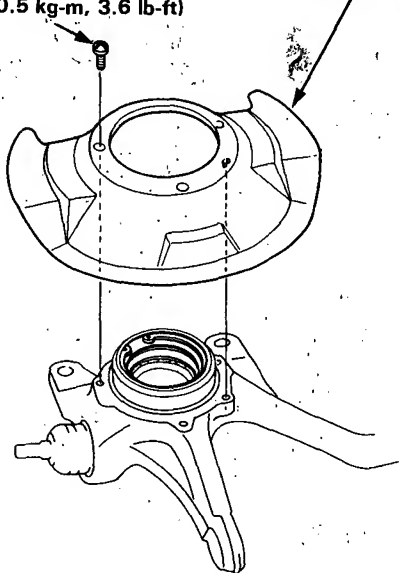




30. Install the splash guard and tighten the screw-washers.

**SCREW-WASHERS**  
5 x 0.8 mm  
5 N·m (0.5 kg-m, 3.6 lb-ft)

**SPLASH GUARD**

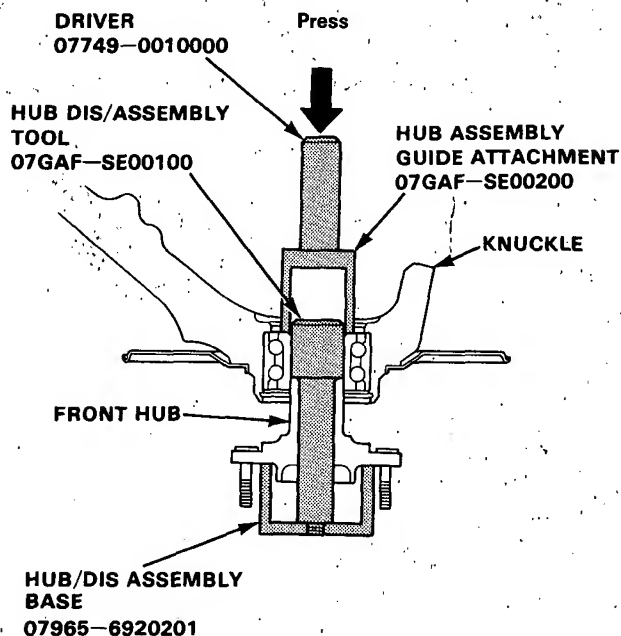


31. Install the shaft into the base with the appropriate size end according to the front hub I.D.
32. Place the front hub onto the special tools and install the pilot.

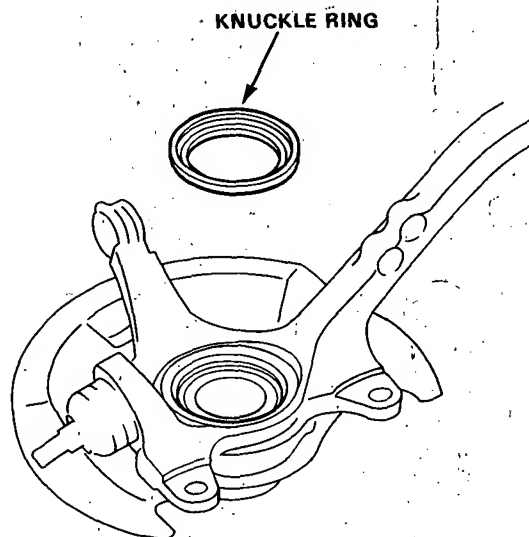
33. Set the knuckle in position and install using the special tools and a press.

**CAUTION:**

- Maximum press load: 2 tons.
- To prevent damage to the tool make sure the threads are fully engaged before pressing.



34. Install the front knuckle ring on the knuckle.

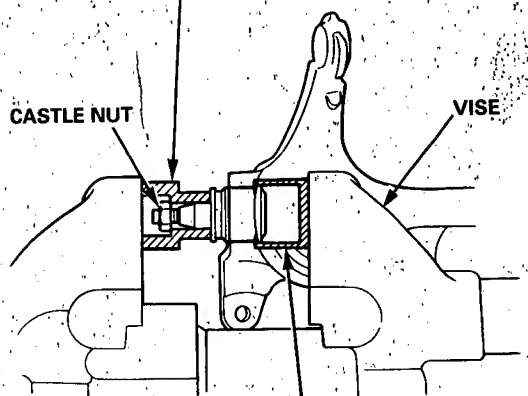


# Front Suspension

## Lower Ball Joint Replacement

1. Remove the knuckle (see page 18-10)
2. Remove the boot by prying off the set ring.
3. Remove the 40 mm circlip.
4. Install the special tool on the ball joint and tighten the castle nut.
5. Position the special tool over the ball joint as shown then set the assembly in a vise. Press the ball joint out of the knuckle.

**BALL JOINT REMOVER/INSTALLER**  
07965-SB00100

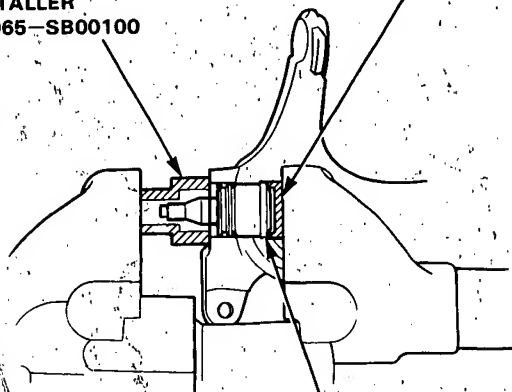


**BALL JOINT REMOVER BASE**  
07965-SB00300

6. Place the ball joint in position by hand.
7. Install the special tools over the ball joint as shown, then press the ball joint in.

**BALL JOINT REMOVER/INSTALLER**  
07965-SB00100

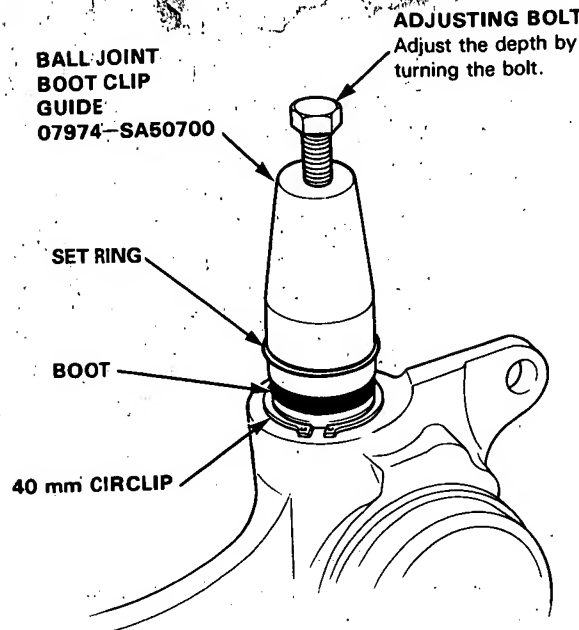
**BALL JOINT INSTALLER BASE**  
07965-SB00200



Ball joint housing surface.

8. Install the 40 mm circlip.
9. Adjust the special tool with the adjusting bolt until the end of the tool aligns with the groove on the boot. Slide the set ring over the tool and into position.

**BALL JOINT BOOT CLIP GUIDE**  
07974-SA50700



SET RING

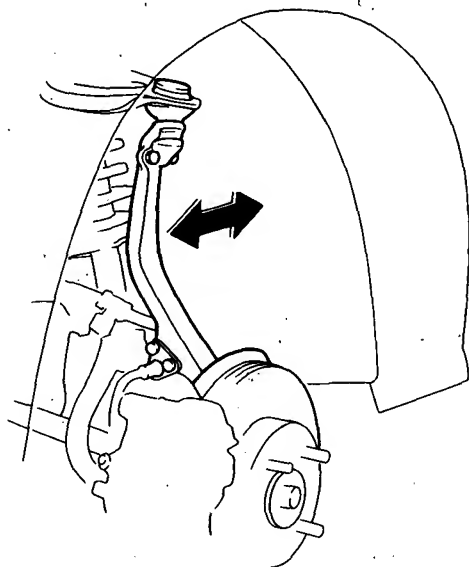
BOOT

40 mm CIRCLIP

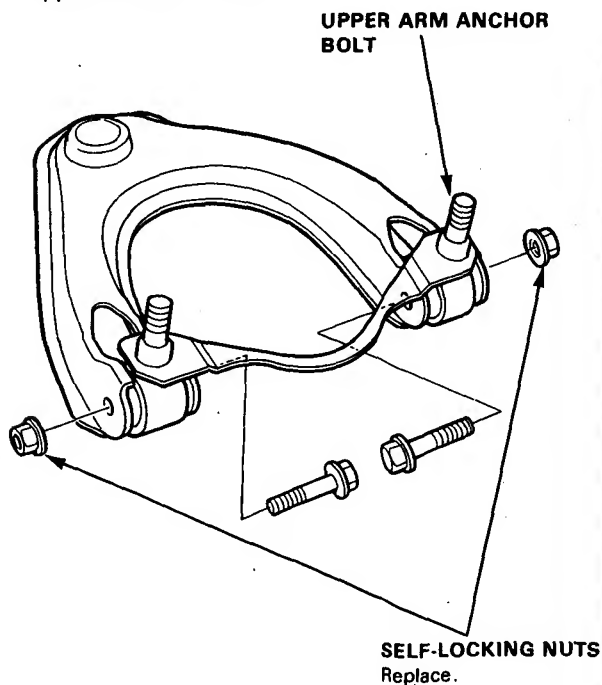


## Upper Arm Bushing Replacement

1. Remove the front wheels.
2. Rock the upper ball joint front-to-back.
3. Replace the upper arm bushings as follows if there is any play.

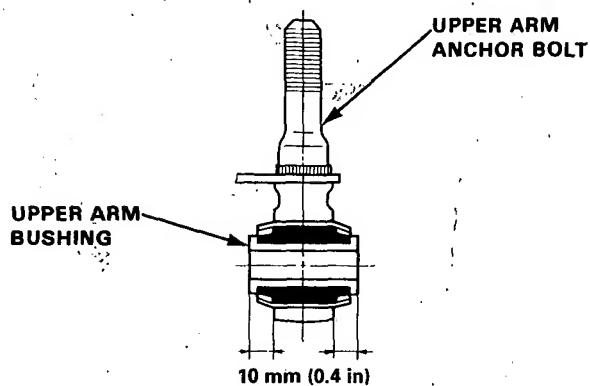


4. Remove the upper arm assembly (see page, 18-9).
5. Remove the self-locking nuts, upper arm bolts and upper arm anchor bolts.



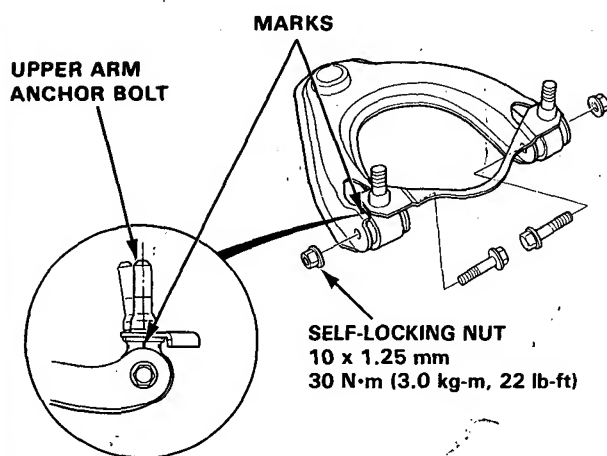
6. Place each upper arm anchor bolt in a vise and drive out the upper arm bushings.
7. Drive the new upper arm bushings into the upper arm anchor bolts.

**NOTE:** Center the bushing so that 10 mm (0.4 in) protrudes from each side of the anchor bolt as shown.



8. Install the upper arm bolts and tighten the self-locking nuts.

**NOTE:** Align the upper arm anchor bolt with the mark on the upper arm.

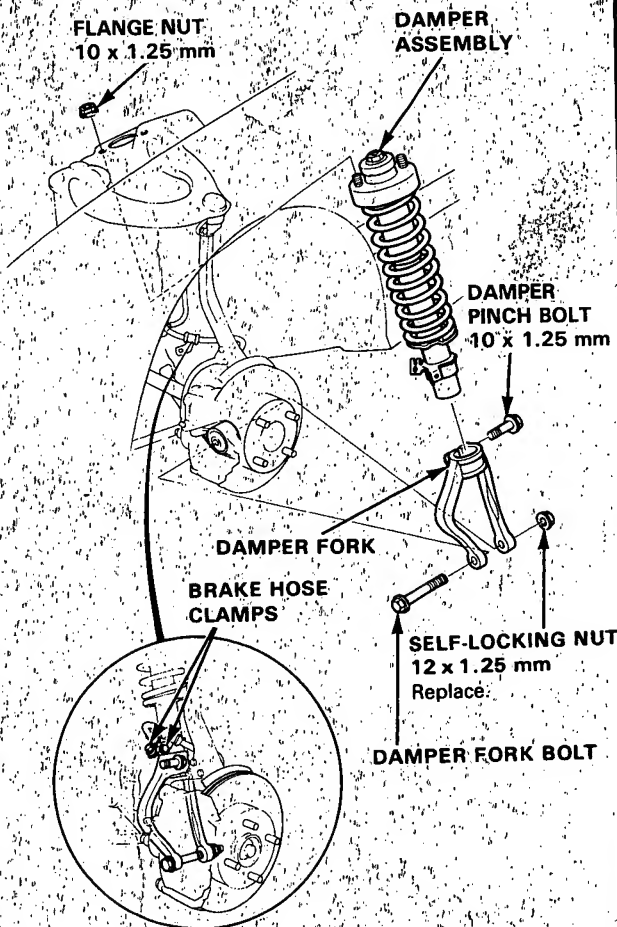


9. After installation, check the camber (see page 18-4).

# Front Damper

## Removal

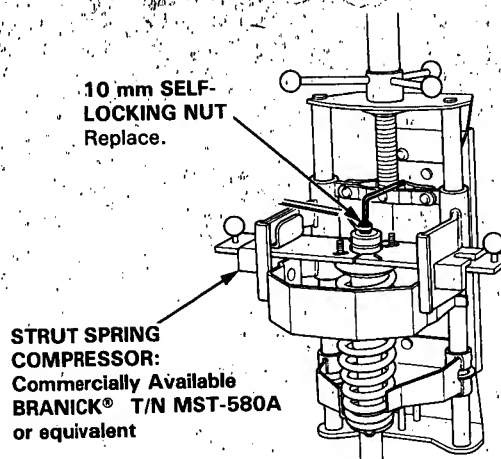
1. Remove the brake hose clamps from the damper.
2. Remove the damper pinch bolt.
3. Remove the damper fork bolt and remove the damper fork.
4. Remove the damper by removing the two flange nuts.



## Disassembly/Inspection

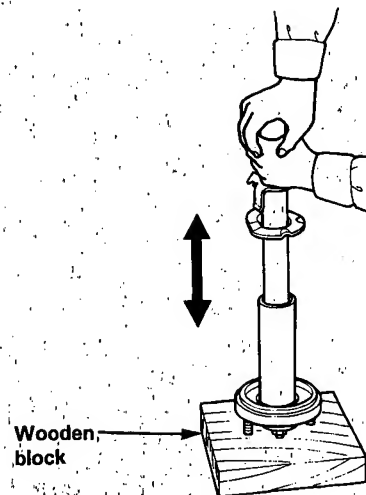
1. Compress the damper spring with the spring compressor according to the manufacturer's instructions, then remove the self-locking nut.

**CAUTION:** Do not compress the spring more than necessary to remove the self-locking nut.



2. Remove the spring compressor then disassemble the damper as shown on the next page.
3. Reassemble all parts, except the spring.
4. Push on the damper assembly as shown.
5. Check for smooth operation through a full stroke, both compression and extension.

**NOTE:** The damper should move smoothly. If it does not (no compression or no extension), the gas is leaking, and the damper should be replaced.

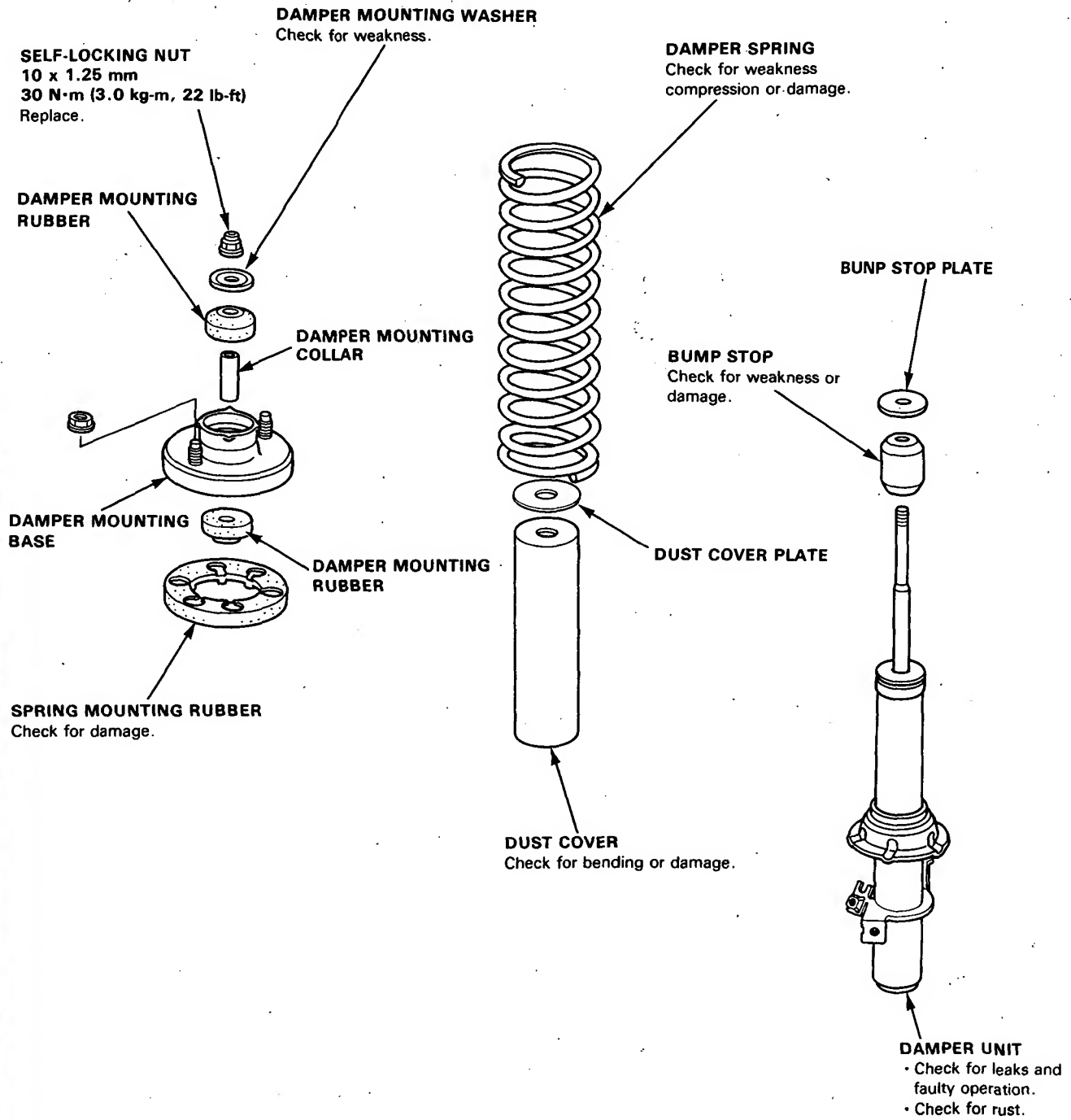


6. Check for oil leaks, abnormal noises or binding during these tests.





## Inspection



# Front Damper

## Reassembly

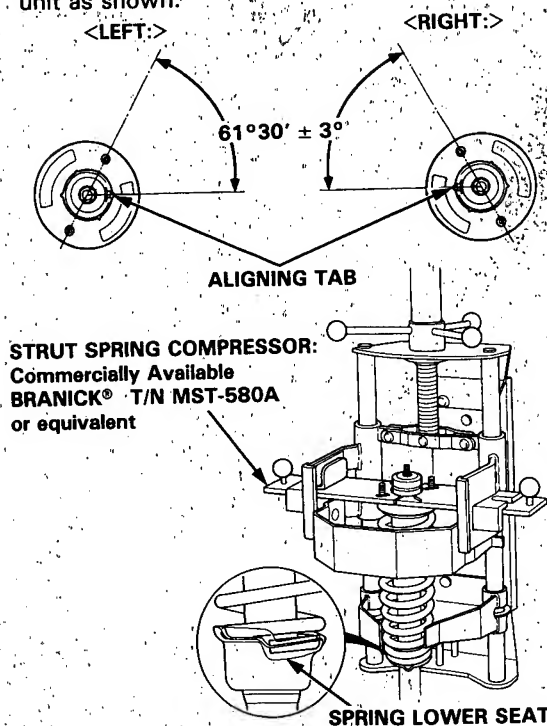
1. Install the damper unit on a spring compressor.

NOTE: Follow the manufacturer's instruction.

2. Assemble the damper in reverse order of disassembly except the damper mounting washer and self locking nut.

NOTE: Align the bottom of the damper spring with the spring lower seat as shown.

3. Position the damper mounting base on the damper unit as shown.

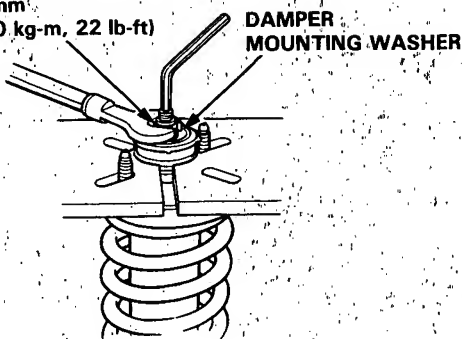


4. Compress the damper spring.

**CAUTION:** Do not compress the spring more than necessary to install the nut.

5. Install the damper mounting rubber, damper mounting washer and a new 10 mm self-locking nut.
6. Hold the damper shaft and tighten the 10 mm self-locking nut.

**SELF-LOCKING NUT**  
10 x 1.25 mm  
30 N·m (3.0 kg-m, 22 lb-ft)

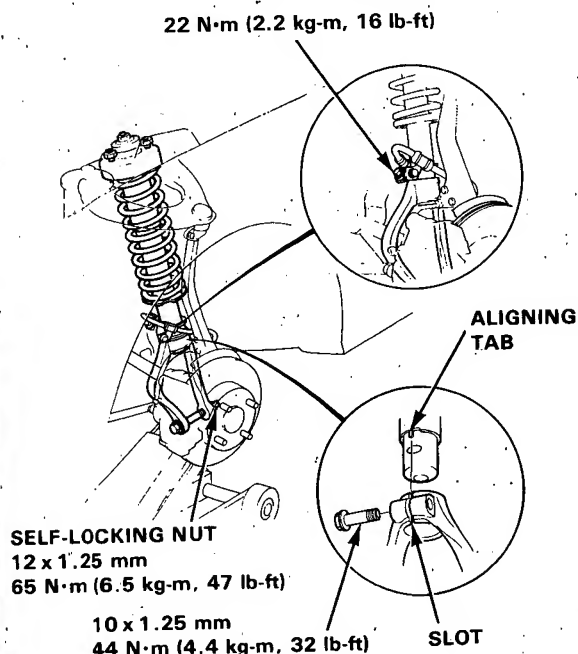


## Installation

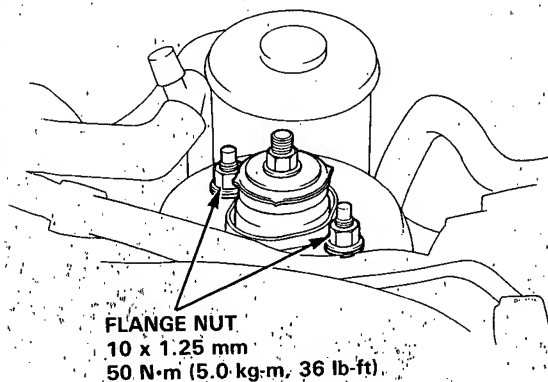
1. Loosely install the damper on the frame with the aligning tab facing inside.
2. Install the damper fork on the driveshaft and lower arm. Install the damper in the damper fork so the aligning tab is aligned with the slot in the damper fork. Hand tighten the bolts and nuts.
3. Raise the knuckle with a floor jack until the car just lifts off the safety stand.

NOTE: The mount base nuts should be tightened with the damper under vehicle load.

4. Tighten the damper pinch bolt.
5. Secure the damper fork bolt with a new self locking nut.
6. Install the brake hose clamps with the two bolts.



7. Secure the damper assembly to the frame with the flange nuts.



**FLANGE NUT**  
10 x 1.25 mm  
50 N·m (5.0 kg-m, 36 lb-ft)

# Rear Suspension

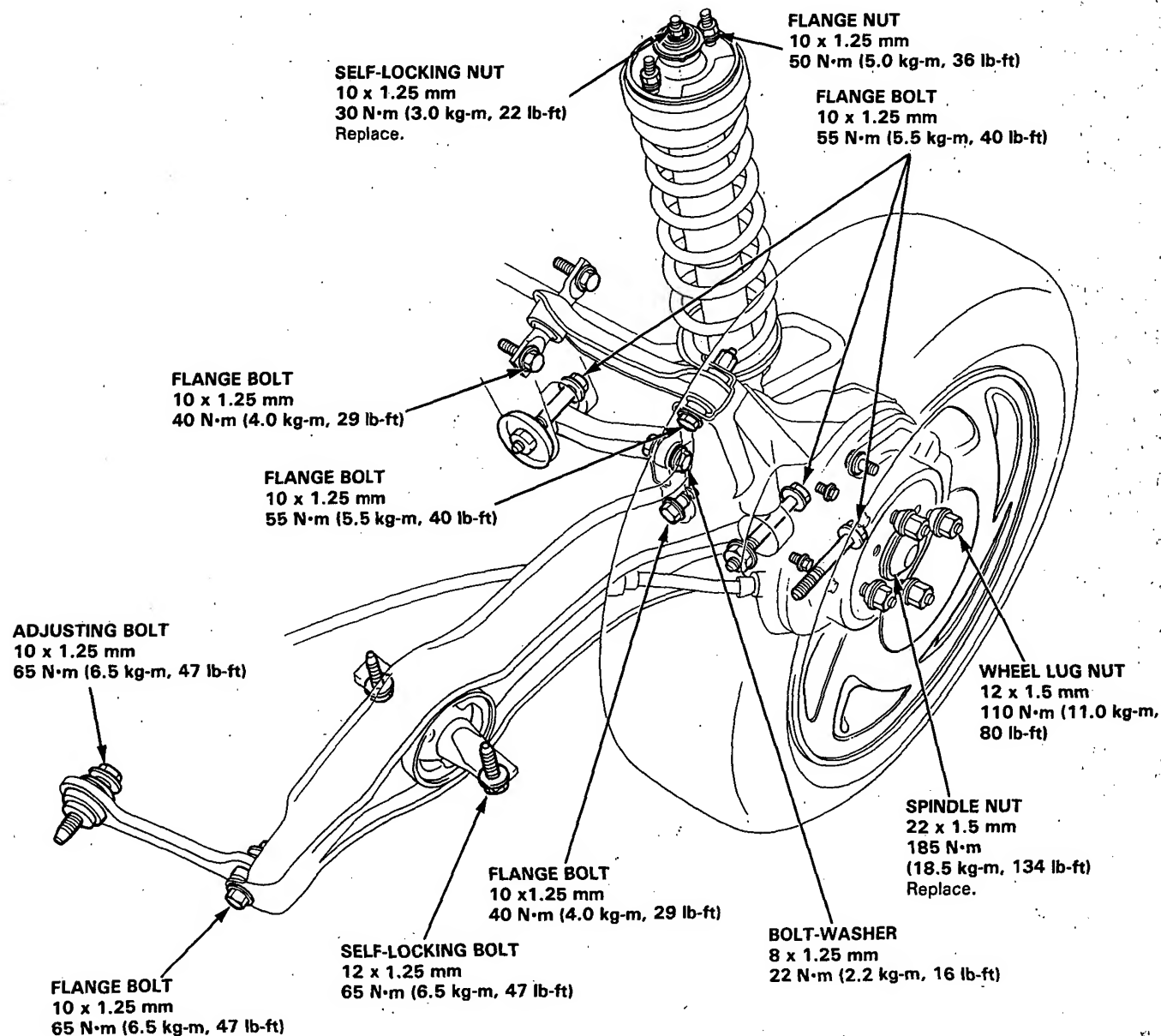
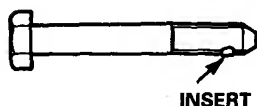
## Torque Specifications



### CAUTION:

- Replace the self-locking nuts after removal.
- Replace the self-locking bolts if you can easily thread a non-self-locking nut past their nylon locking inserts. (It should require 1 N·m (0.1 kg-m, 0.7 lb-ft) of torque to turn the test nut on the bolt).
- The vehicle should be on the ground before any bolts or nuts connected to rubber mounts or bushings are tightened.

NOTE: Wipe off the dirt, oil or grease on the threads before tightening the fasteners.

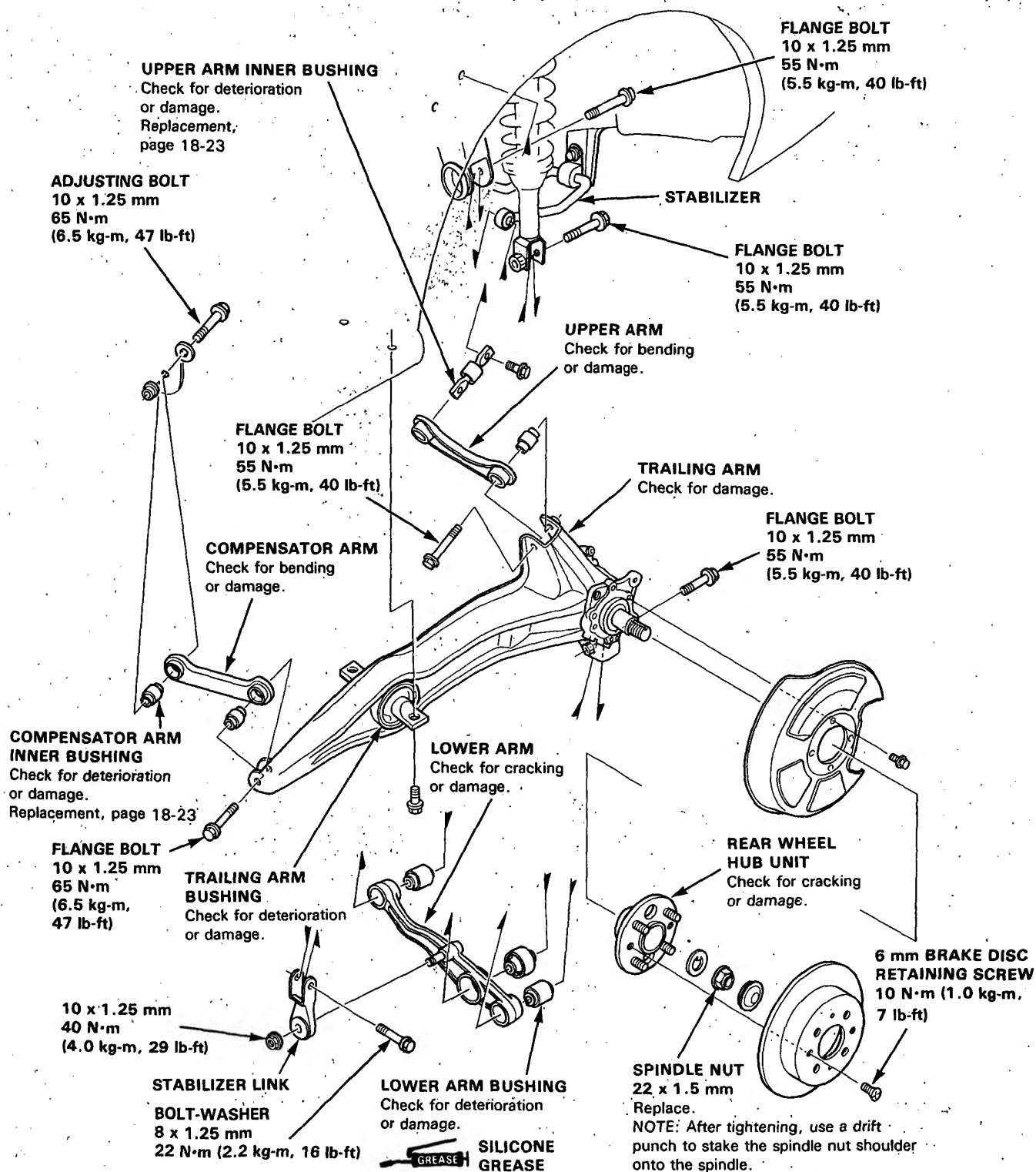


# Rear Suspension

## Illustrated Index

### NOTE:

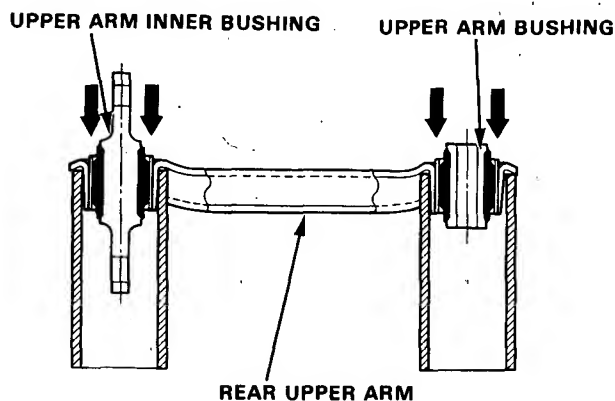
- Use only genuine Honda wheel weights. Non-genuine wheel weights may corrode and damage the aluminum wheel.
- Remove the center cap by prying it out with a flat screwdriver. Use a rag at the point you are going to pry, because aluminum alloy wheels can be easily damaged. Avoid damage to the cap by not allowing it to fall during removal.
- Before installing the brake disc, clean the mating surfaces of the rear hub and inside of the brake disc.
- Before installing the wheel, clean the mating surfaces of the brake disc and inside of the wheel.



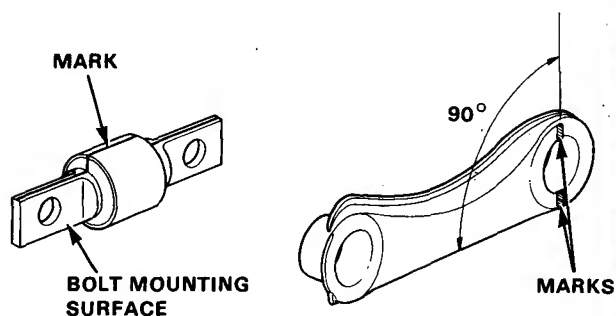


## Upper Arm Bushing Replacement

1. Remove the upper arm bushing and inner bushing as shown:

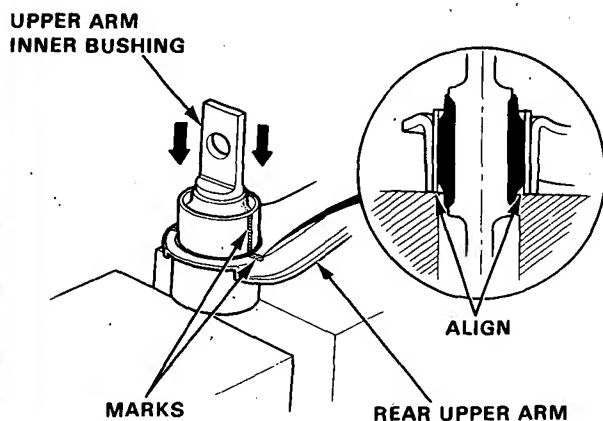


2. Mark a scribe line on the upper arm inner bushing so that it is in line with the bolt mounting surface.
3. Mark on the upper arm at two points so that they are in line and make a right angle with the arm as shown in the drawing.



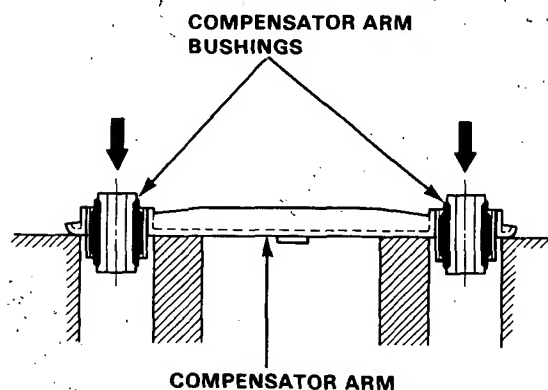
4. Drive in the upper arm inner bushing with the marks aligned.
5. Drive the upper arm bushing into the upper arm.

NOTE: Drive in the upper arm bushing and inner bushing until their leading edges are flush with the upper arm.



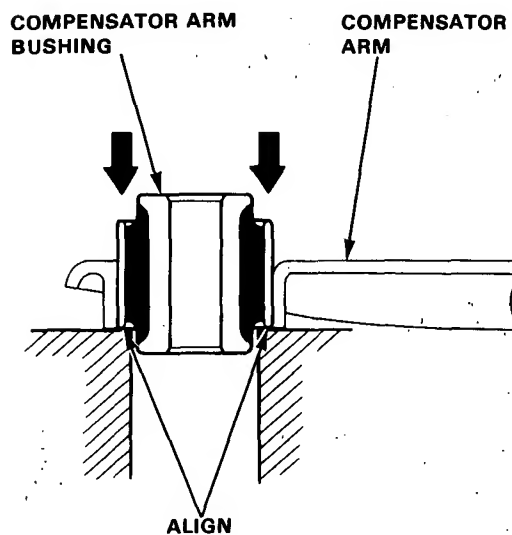
## Compensator Arm Bushing Replacement

1. Drive the compensator arm bushing out of the compensator from the direction indicated.



2. Drive in the compensator arm bushings from the direction indicated.

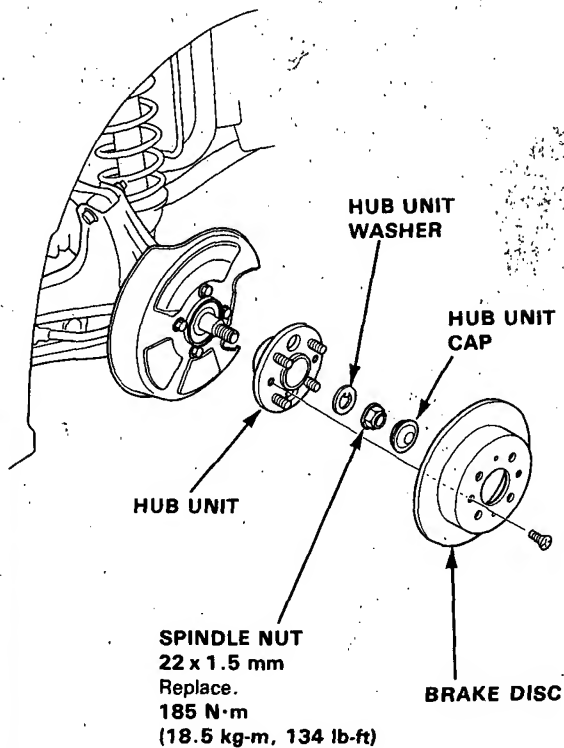
NOTE: Drive in the compensator arm bushings so that their leading edges are flush with the compensator arm.



## Rear Suspension

### Hub Unit Bearing Replacement

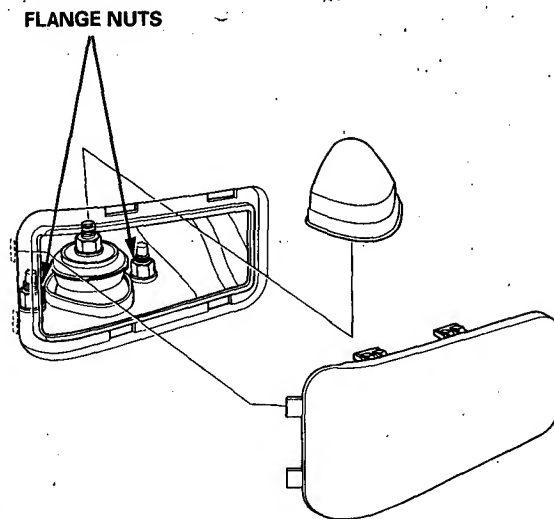
1. Jack up the rear of car and support on safety stands in proper location (see section 1).
2. Remove the rear wheel and brake disc.
3. Remove the hub unit cap, unstake the spindle nut, then loosen the spindle nut.
4. Remove the hub unit and hub unit bearing.



## Rear Damper

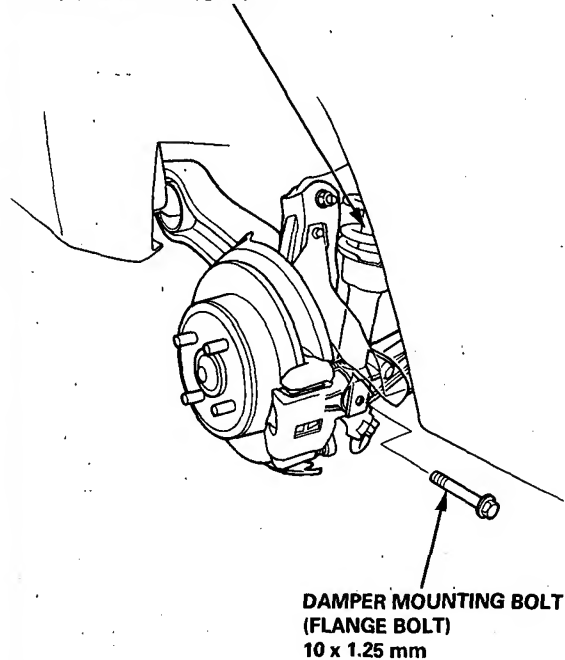
### Removal

1. Jack up the rear of car and support on safety stands in proper locations (see section 1).
2. Remove the damper upper cover at the rear seat lining.
3. Remove the flange nuts.



4. Remove the damper mounting bolt.
5. Lower the lower arms and remove the damper assembly.

### REAR DAMPER ASSEMBLY



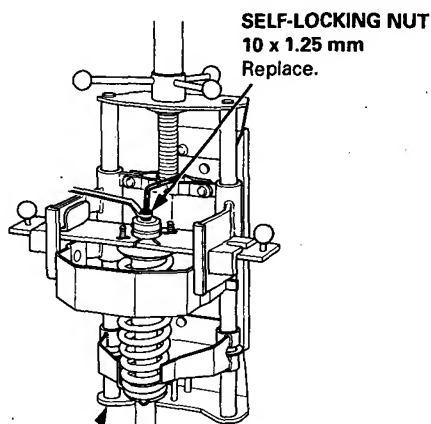


## Disassembly

1. Compress the damper spring with the spring compressor according to the manufacturer's instructions.

**CAUTION:** Do not compress the spring more than necessary to remove the self-locking nut.

2. Remove the self-locking nut from the damper assembly.

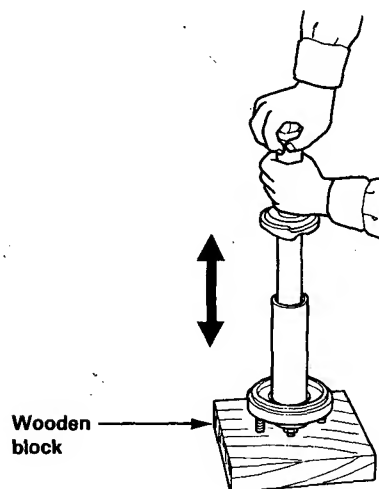


3. Remove the spring compressor and disassemble the damper as shown on the next page.

## Inspection

1. Reassemble all parts, except the spring.
2. Push on the damper assembly as shown.
3. Check for smooth operation through a full stroke, both compression and extension.

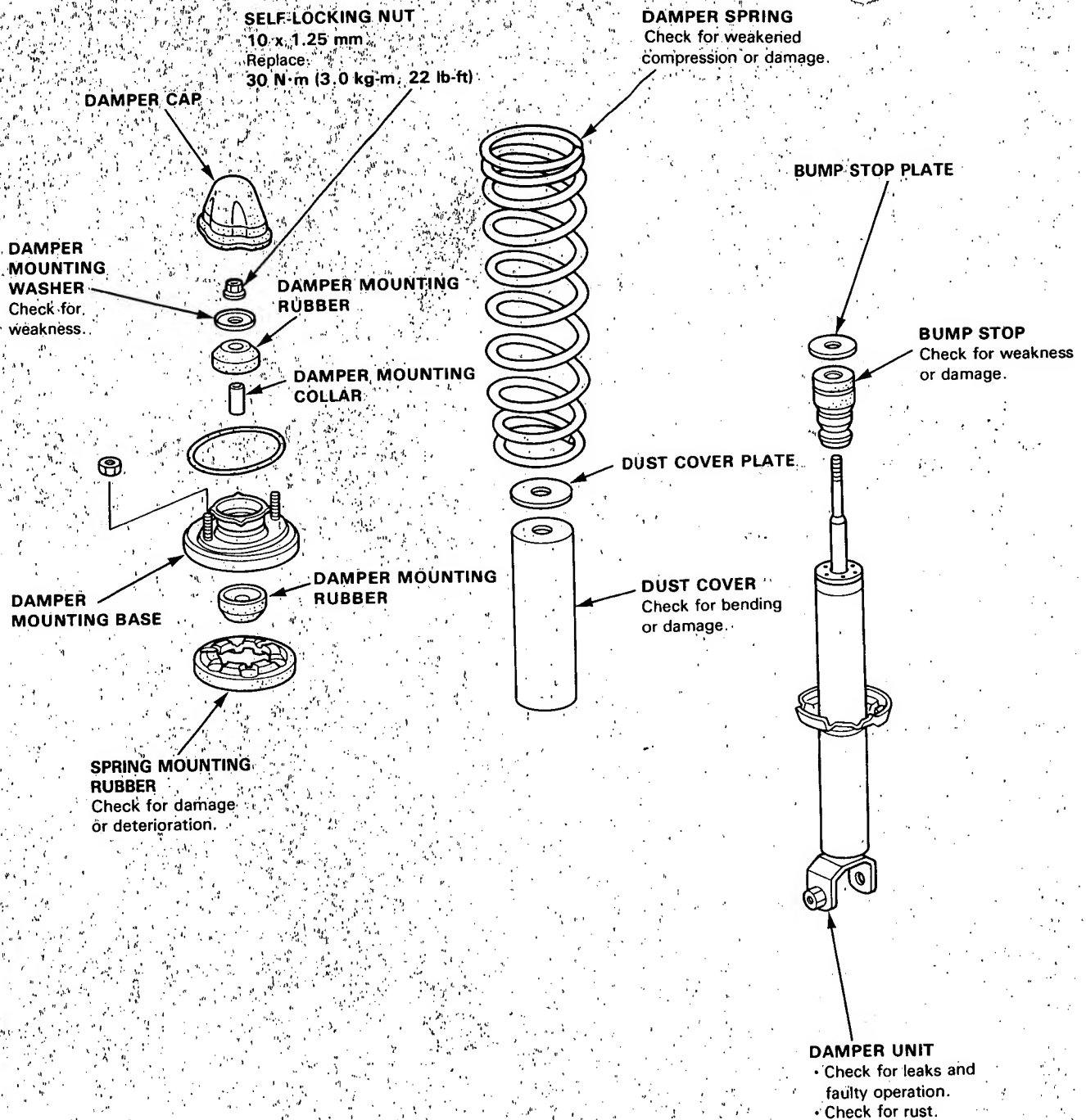
**NOTE:** The damper should move smoothly. If it does not (no compression or no extension), the gas is leaking, and the damper should be replaced.



4. Check for oil leaks, abnormal noises or binding during these tests.

# Rear Damper

## Inspection

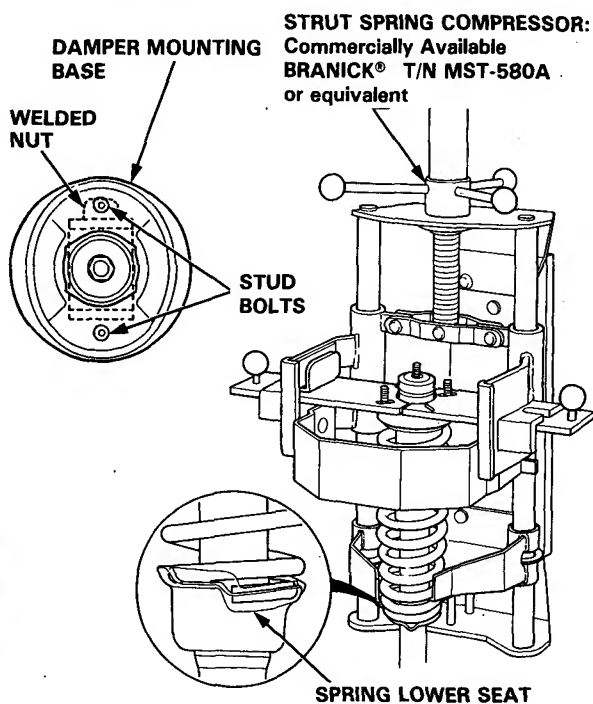






## Reassembly

1. Install the damper unit on a spring compressor.  
NOTE: Follow the manufacturer's instructions.
2. Assemble the rear damper in reverse order of disassembly except the damper mounting washer and self-locking nut.  
NOTE: Align the bottom of the damper spring with the spring lower seat as shown.
3. Position the damper mounting base on the damper unit as shown.

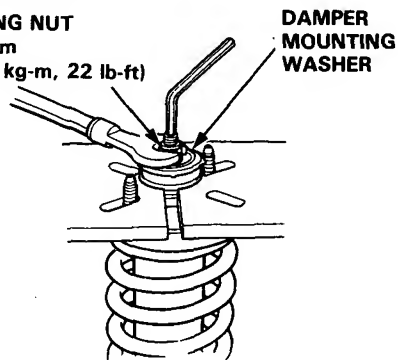


4. Compress the damper spring with the spring compressor.

**CAUTION:** Do not compress the spring more than necessary to install the nut.

5. Install the damper mounting washer, and loosely install a new self-locking nut.
6. Hold the damper shaft by hex wrench and tighten the self-locking nut.

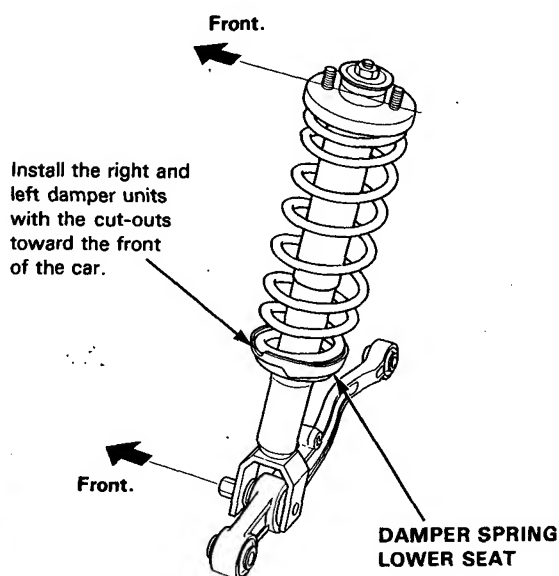
**SELF-LOCKING NUT**  
10 x 1.25 mm  
30 N·m (3.0 kg-m, 22 lb-ft)



## Installation

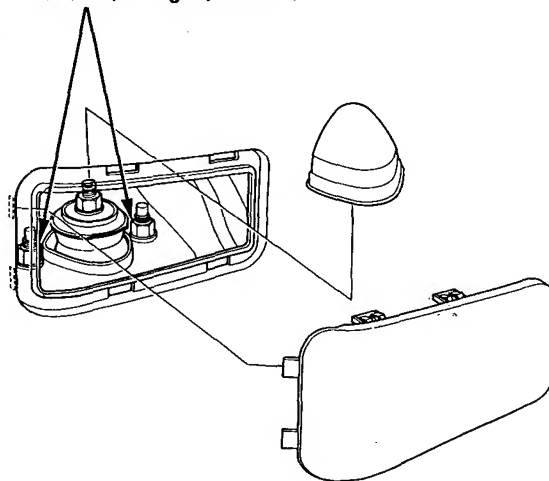
1. Lower the rear suspension and set the damper assembly.

**CAUTION:** Be sure that the two cut-outs in the damper spring lower seat are toward the front of the car as shown below.



2. Loosely install the damper mounting bolt.
3. Install the flange nuts and tighten them.

**FLANGE NUTS**  
10 x 1.25 mm  
50 N·m (5.0 kg-m, 36 lb-ft)



4. Install the damper cap.

(cont'd)

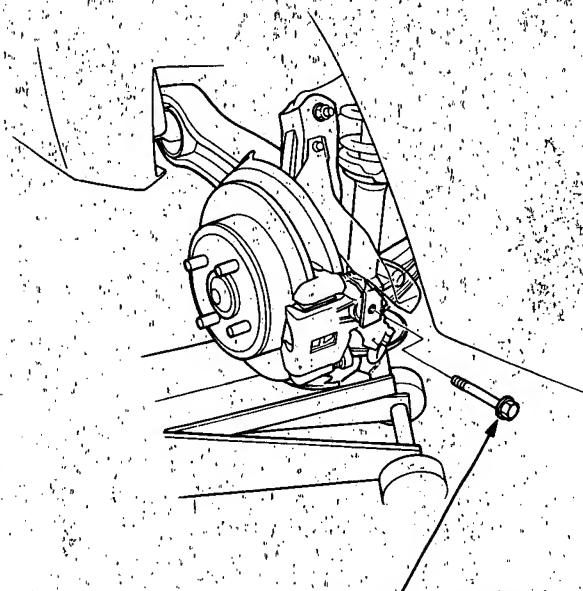
## Rear Damper

### Installation (cont'd)

5. Raise the rear suspension with a floor jack until the weight of the car is on the damper.

NOTE: The damper mounting bolts should be tightened with the damper under vehicle load.

6. Tighten the damper mounting bolt.



**DAMPER MOUNTING BOLT  
(FLANGE BOLT)**  
10 x 1.25 mm  
55 N·m (5.5 kg-m, 40 lb-ft)

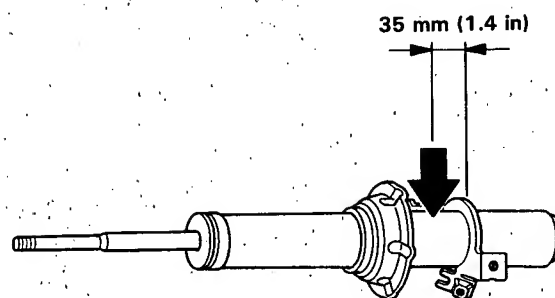
## Damper Disposal

### ⚠ WARNING

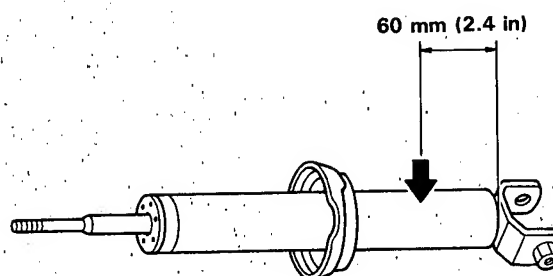
- The dampers contain nitrogen gas and oil under pressure. The pressure must be relieved before disposal to prevent explosion and possible injury when scrapping.
- Always wear eye protection to avoid getting metal shavings in your eyes when the gas damper pressure is relieved.

Place the damper on a level surface with its rod extended and drill a hole of 2.0 — 3.0 mm (0.08 — 0.12 in) diameter in the body to release the gas.

### Front Damper



### Rear Damper

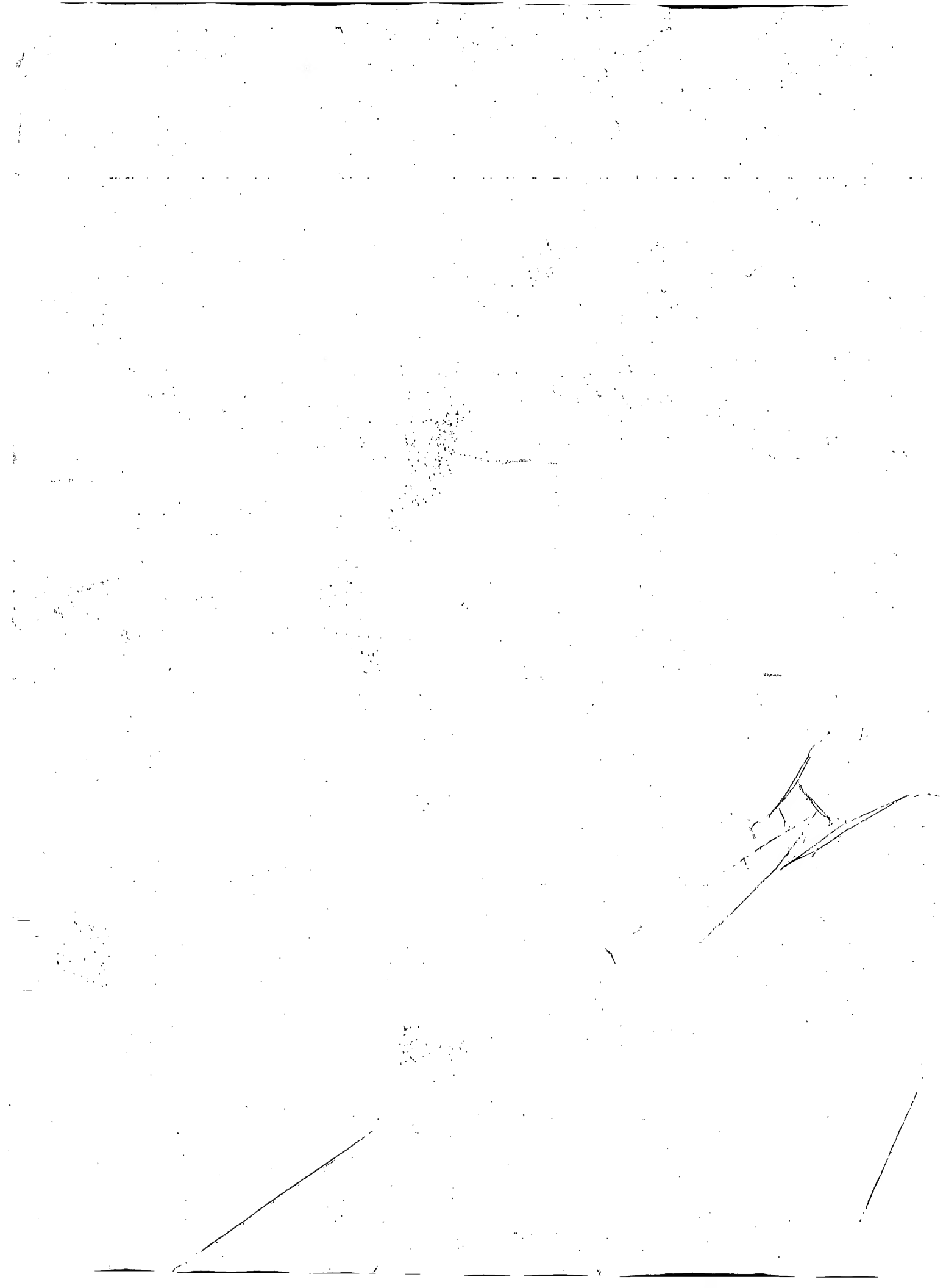


## **Brakes**

**Conventional Brakes ..... 19-1**

**Anti-lock Brake System (ABS) ..... 19-29**





## Conventional Brakes

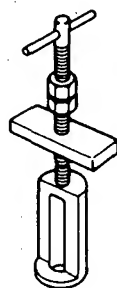
Special Tools .....	19-2
Illustrated Index .....	19-3
Pedal Height Adjustment .....	19-4
Parking Brake Adjustment .....	19-4
Front Brakes	
Inspection .....	19-5
Brake Pad Inspection/ Replacement .....	19-6
Brake Caliper	
Disassembly .....	19-7
Reassembly .....	19-8
Brake Disc Inspection .....	19-9
Bleeding .....	19-10
Brake Booster	
Testing .....	19-11
Master Cylinder, Booster	
Removal/Installation .....	19-12
Pushrod Clearance Adjustment .....	19-14
Master Cylinder	
Inspection .....	19-15

Rear Brakes	
Inspection .....	19-16
Brake Pad/Disc Inspection and Replacement .....	19-17
Rear Caliper	
Disassembly .....	19-19
Reassembly .....	19-23
Brake Hoses/Pipes	
Inspection .....	19-26
Brake Hoses Replacement .....	19-27
Parking Brake	
Disassembly and Reassembly .....	19-28

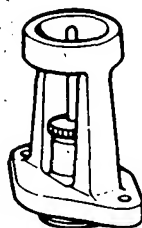


# Special Tools

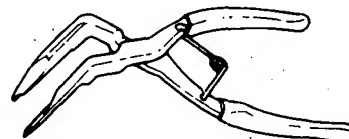
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07HAE—SG00100	Brake Spring Compressor	1	19-20, 24
②	07JAG—SD40100	Pushrod Adjustment Gauge	1	19-14
③	07914—SA50000	Snap Ring Pliers	1	19-21, 24
④	07916—6390001	Locknut Wrench	1	19-20, 25



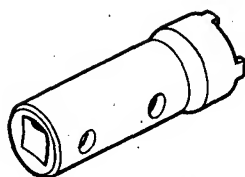
①



②



③



④

# Brake

## Illustrated Index



### **BRAKE BOOSTER**

Testing, page 19-11  
Removal/Installation, page 19-12  
Pushrod Clearance Adjustment, page 19-14

### **MASTER CYLINDER**

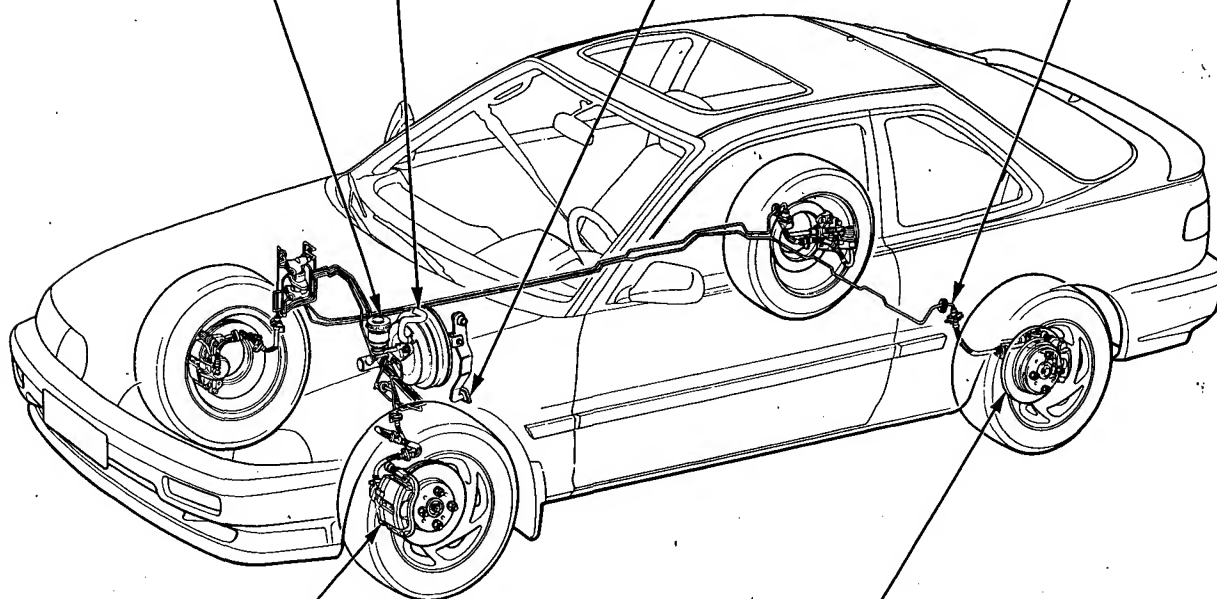
Removal/Installation, page 19-12  
Inspection, page 19-15

### **BRAKE PEDAL**

Pedal Height Adjustment, page 19-4  
Brake Light Switch Adjustment, page 19-4

### **BRAKE HOSES/PIPES**

Inspection, page 19-26  
Brake Hoses Replacement  
page 19-27



### **FRONT BRAKE**

Inspection, page 19-5  
Brake Pad Inspection/Replacement, page 19-6  
Brake Caliper Disassembly, page 19-7  
Brake Caliper Reassembly, page 19-8  
Brake Disc Inspection, page 19-9

### **REAR BRAKE**

Inspection, page 19-16  
Brake Pad Inspection/Replacement, page 19-17  
Brake Caliper Disassembly, page 19-19  
Brake Caliper Reassembly, page 19-22  
Brake Disc Inspection, page 19-18

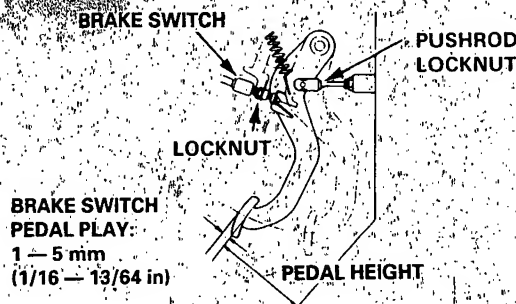
### **PARKING BRAKE**

Adjustment, page 19-4  
Disassembly and Reassembly, page 19-28

## Pedal Height

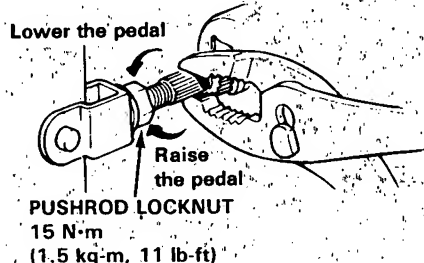
### Adjustment

1. Loosen the brake switch locknut and back off the brake switch until it is no longer touching the brake pedal.

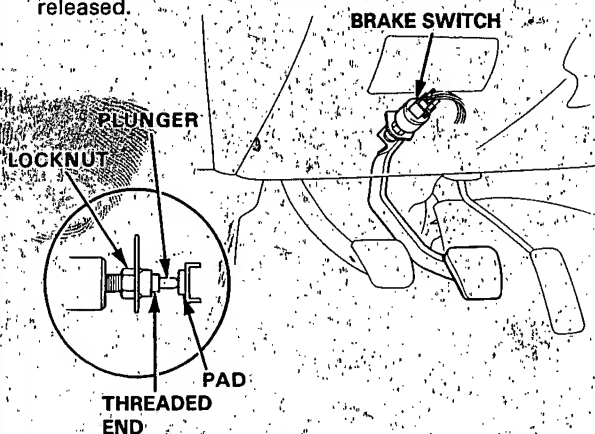


**PEDAL HEIGHT:** (Measure without floor mat.)  
**MANUAL TRANSMISSION:** 155 mm (6.1 in)  
**AUTOMATIC TRANSMISSION:** 160 mm (6.3 in)

2. Loosen the pushrod locknut and screw the pushrod in or out with pliers until the pedal height from the floor is properly adjusted. After adjustment, tighten the locknut firmly.



3. Screw in the brake switch until its plunger is fully depressed (threaded end touching pad on pedal arm). Then back off brake switch 1/2 turn and tighten locknut firmly.
4. Check that the brake lights go off when the pedal is released.



5. Check the pedal free play.

**CAUTION:** If the pedal free play is too little or no, it may result in brake drag.

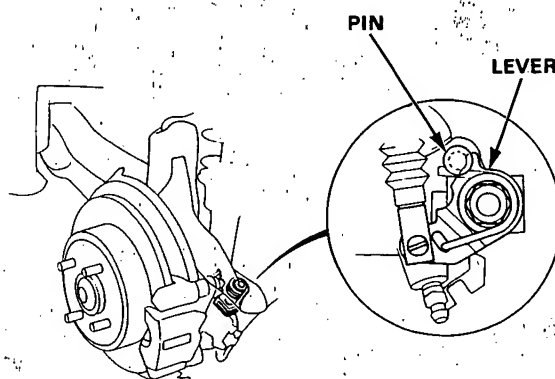
## Parking Brake

### Adjustment

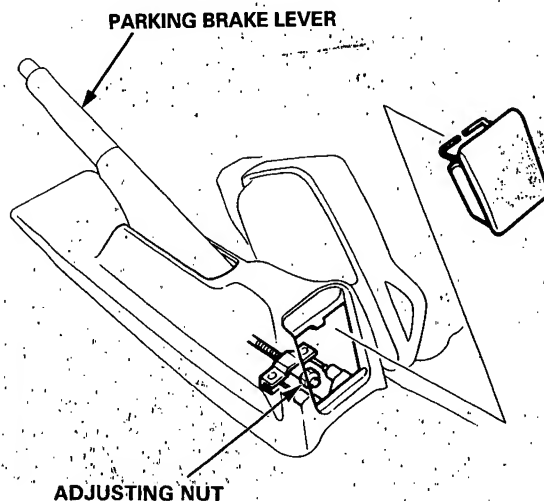
**NOTE:** After rear brake caliper servicing, loosen the parking brake adjusting nut, start the engine and depress the brake pedal several times to set the self-adjusting brakes before adjusting the brake pedal.

**WARNING:** Block the front wheels before jacking up the rear of the car.

1. Raise the rear wheels off the ground.
2. Make sure the lever of the rear brake caliper contacts the brake caliper pin.



3. Pull the parking brake lever up one notch.
4. Tighten the adjusting nut until the rear wheels drag slightly when turned.
5. Release the parking brake lever and check that the rear wheels do not drag when turned. Readjust if necessary.
6. With the equalizer properly adjusted, the rear brakes should be fully applied when the parking brake lever is pulled up 6 to 10 clicks.





# Front Brakes

## Inspection

Br

**⚠ WARNING** Do not use an air hose to blow the brake assembly clean. Use an OSHA-approved vacuum cleaner, to avoid breathing brake dust.

### CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.

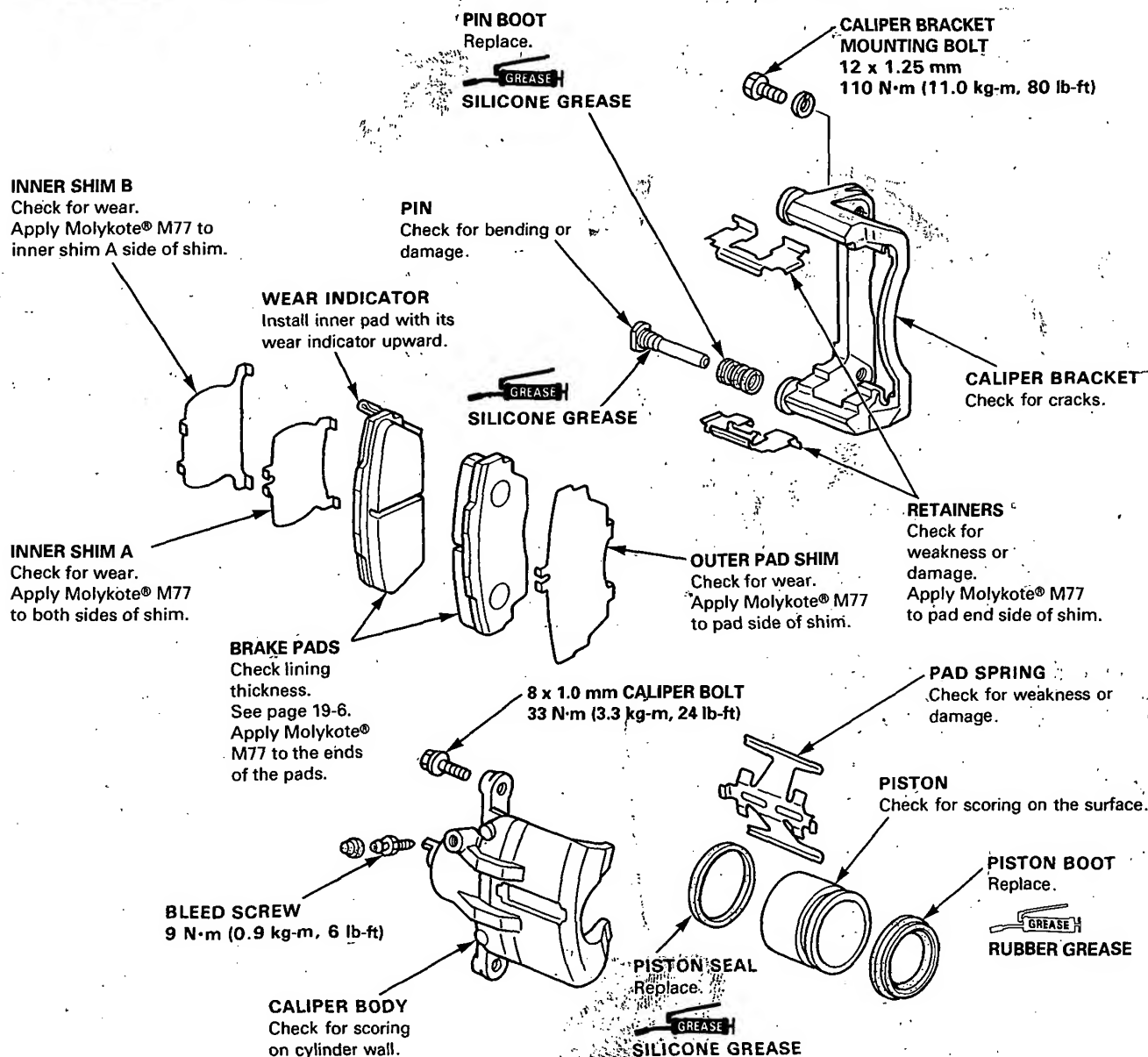
 : BRAKE CYLINDER GREASE (P/N 08733-B020E) OR EQUIVALENT RUBBER GREASE

 : SILICONE GREASE

- Before reassembling, check free of dust and other foreign matter.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only new DOT 3 or 4 brake fluid.

### NOTE:

- Coat the piston, piston seal, and caliper bore with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.



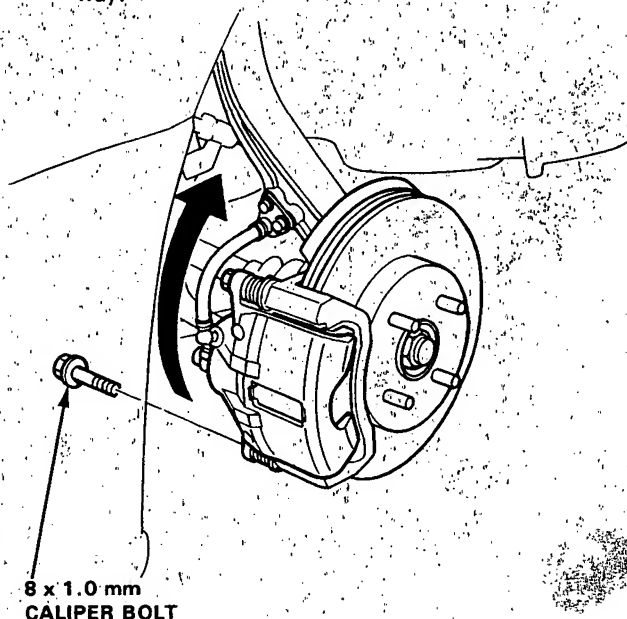
# Brake Pad

## Inspection/Replacement

### ⚠ WARNING

- Do not use an air hose to blow the brake assembly clean. Use an OSHA-approved vacuum cleaner, to avoid breathing brake dust.
- Contaminated brake pads or disc reduce stopping power. Keep grease or oil off the brake pads or disc. Wipe any excess grease off the parts.

1. Remove the front wheels and support the front of the car on safety stands.
2. Remove the caliper bolt and pivot caliper up out of the way.

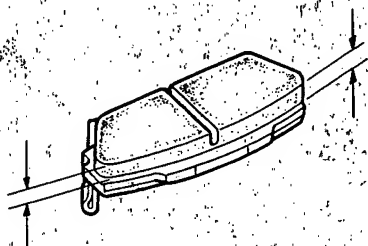


3. Remove the pad shims, pad retainers and pads.
4. Using a vernier caliper, measure the thickness of each brake pad lining.

### Brake Pad Thickness:

Standard: 11.0 mm (0.43 in)

Service limit: 1.6 mm (0.06 in)

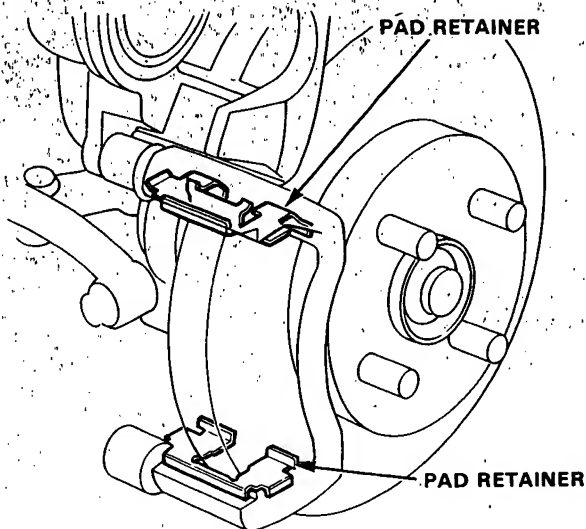


NOTE: Measurement does not include pad backing thickness.

5. If lining thickness is less than service limit, replace both brake pads as a set.

6. Clean the caliper thoroughly; remove any rust, and check for grooves or cracks.

7. Install the pad retainers.



8. Apply Molykote® M77 compound to the pad shims.
9. Install the brake pads and pad shims correctly.

### ⚠ WARNING

- When reusing the pads, always reinstall the brake pads in their original positions to prevent loss of braking efficiency.
- Contaminated brake discs or pads reduce stopping ability. Keep grease off the discs and pads.

NOTE: Install the pad with the wear indicator on the inside.

### INNER SHIM B

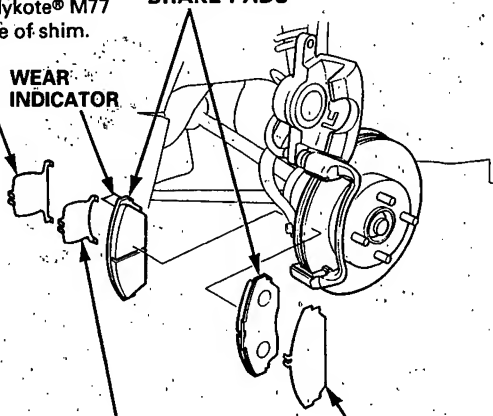
Apply Molykote® M77 to pad side of shim.

### BRAKE PADS

WEAR INDICATOR

INNER SHIM A  
Apply Molykote® M77 to both sides of shims.

OUTER PAD SHIM  
Apply Molykote® M77 to pad side of shim.





# Brake Caliper

## Disassembly

### ⚠ WARNING

- Never use an air hose or dry brush to clean brake assemblies.
- Use an OSHA – approved vacuum cleaner to avoid breathing brake dust.

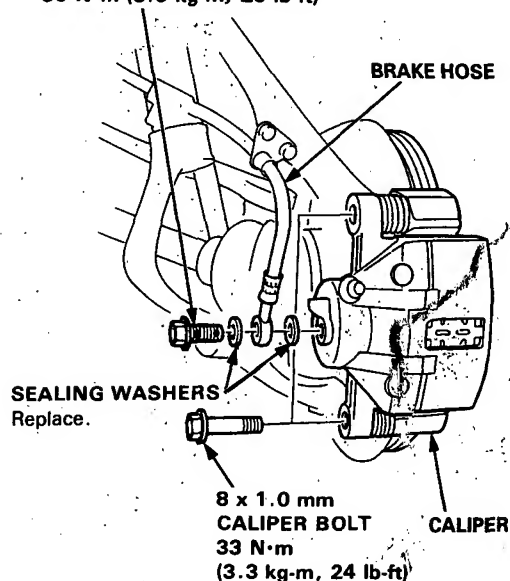
### CAUTION:

- Make sure all parts are clean before reassembly.
- Use only new replacement parts.
- Use only clean DOT 3 or 4 brake fluid.
- Do not allow dirt or other foreign matter to contaminate the brake fluid.
- Do not mix different brands of brake fluid.
- Avoid spilling brake fluid on painted, plastic or rubber surfaces as it can damage the finish.
- Wash spilled brake fluid off immediately with clean water.

1. Remove the banjo bolt and disconnect the brake hose from the caliper.
2. Remove the caliper bolts, then remove the caliper.

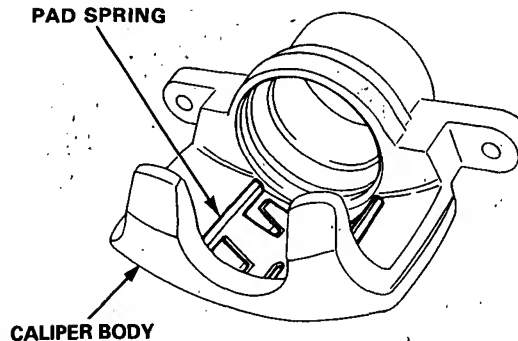
### BANJO BOLT

10 x 1.0 mm  
35 N·m (3.5 kg-m, 25 lb-ft)



3. Remove the pad spring from the caliper body.

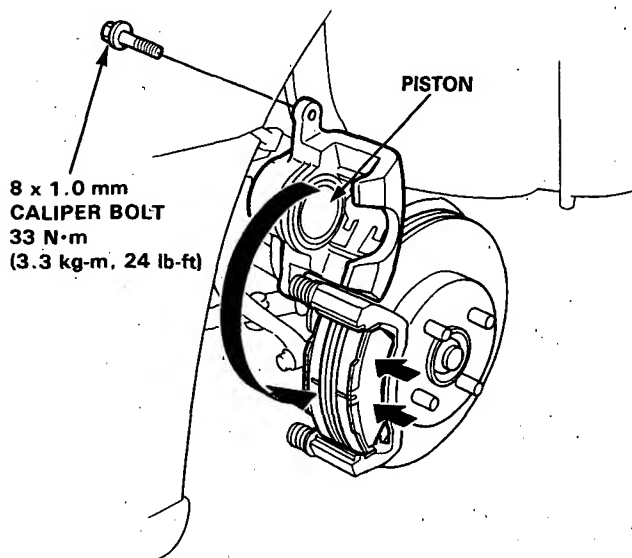
### PAD SPRING



(cont'd)

10. Push in the piston so that the caliper will fit over the pads. Keep the boot in position to prevent damaging the boot when pivoting the caliper down.

11. Pivot the caliper down into position, then install the caliper bolt and tighten to the specified torque.



12. Install the brake hose clamp bolts to the knuckle.

13. Depress the brake pedal several times to make sure the brakes work, then road test.

**NOTE:** Engagement of the brake may require a greater pedal stroke immediately after the brake pads have been replaced as a set. Several applications of the brake pedal will restore the normal pedal stroke.

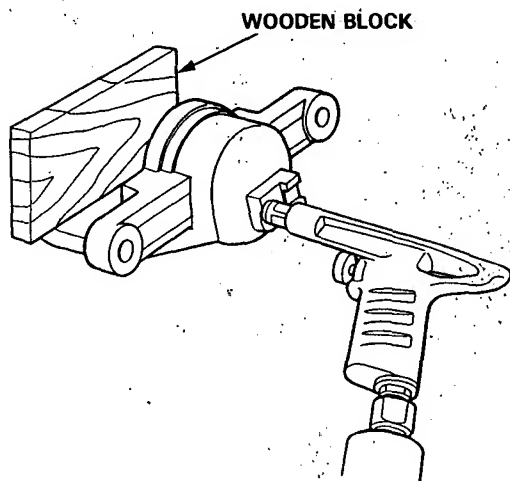
# Brake Caliper

## Disassembly (cont'd)

- Place a wooden block or shop rag in the caliper opposite the piston, then carefully remove the piston from the caliper by applying air pressure through the brake line hole.

### WARNING

- Do not place your fingers in front of the piston.
- Do not use high air pressure; use an OSHA approved 30 PSI nozzle.



- Remove the piston boot and piston seal.

**CAUTION:** Take care not to damage the cylinder.

PISTON SEAL  
Replace.



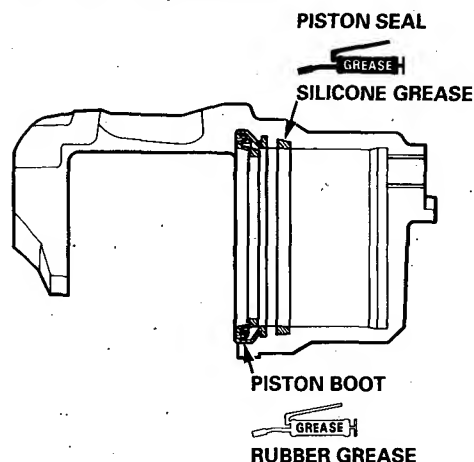
PISTON BOOT  
Replace.

## Reassembly

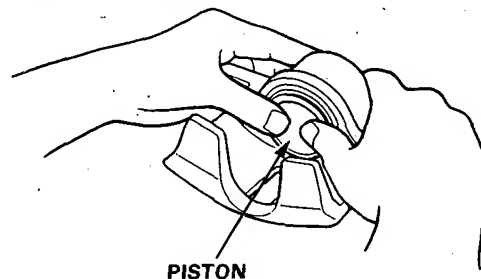
### CAUTION:

- Make sure all parts are clean before reassembly.
- Use only new replacement parts.
- Use only clean DOT 3 or 4 brake fluid.
- Do not allow dirt or other foreign matter to contaminate the brake fluid.
- Do not mix different brands of brake fluid.
- Avoid spilling brake fluid on painted, plastic or rubber surfaces as it can damage the finish.
- Wash spilled brake fluid off immediately with clean water.

- Clean the piston and caliper bore with brake fluid and inspect for wear or damage.
- Apply silicone grease to a new piston seal, then install the piston seal in the cylinder groove.
- Apply brake cylinder grease (P/N: 08733 — B020E) or equivalent rubber grease to a new piston boot, then install the piston boot.



- Lubricate the caliper cylinder and piston with brake fluid, then install the piston in the cylinder with the dished end facing in.



- Reinstall the caliper in the reverse order of removal.

### WARNING

Always reinstall the brake pads in their original positions to prevent loss of braking efficiency.

- Fill the brake reservoir up and bleed the brake system (see page 19-10).

# Brake Disc



## Run-Out Inspection

1. Remove the front wheels, and support the front of the car on safety stands.
2. Remove the caliper pin bolt, pivot the caliper up out of the way on the caliper pin bolt, then remove the pads and pad retainers (see page 19-6).
3. Inspect the disc surface for grooves, cracks, and rust. Clean the disc thoroughly and remove all rust.
4. Mount a dial indicator as shown and measure the runout at 10 mm (0.4 in) in from the outer edge of the disc.

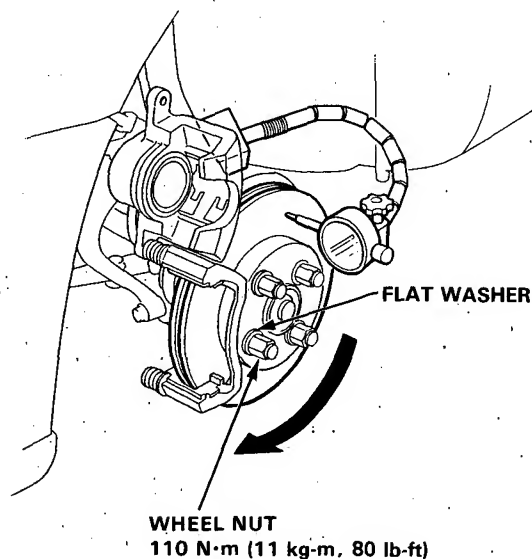
**CAUTION:** Use wheel nuts and 3 mm thick flat washers to hold the disc securely.

**Brake Disc Runout:**

**Service Limit: 0.10 mm (0.004 in)**

5. If the disc is beyond the service limit, refinish the rotor with an on-car brake lathe. The Kwik-Lathe produced by Kwik-Way Manufacturing Co. and the "Front Brake Disc Lathe" offered by Snap-on Tools Co. are approved for this operation.

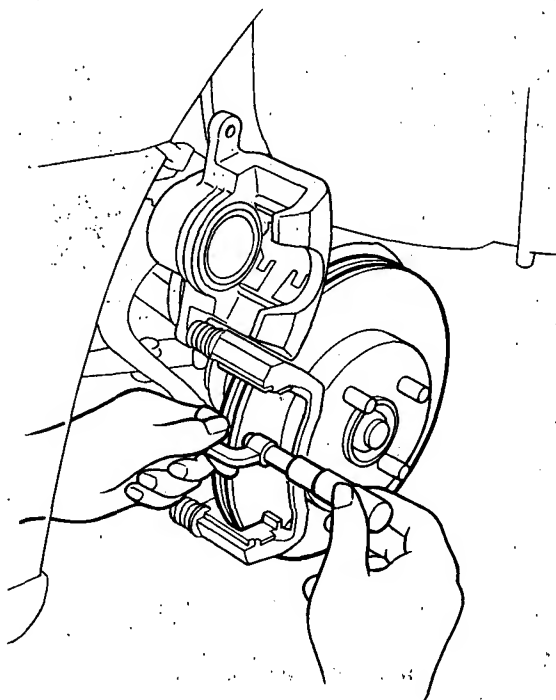
**Max: Refinishing Limit: 19 mm (0.75 in)**



**NOTE:** A new disc should be refinished if its runout is greater than 0.10 mm (0.004 in).

## Thickness and Parallelism Inspection

1. Remove the front wheels, and support the front of the car on safety stands.
2. Move the caliper and pads out of the way as described in the preceding column.
3. Using a micrometer, measure disc thickness at eight points, approximately 45° apart and 10 mm (0.4 in) in from the outer edge of the disc.



**Brake Disc Thickness:**

**Standard: 21.0 mm (0.83 in)**

**Brake Disc Parallelism: 0.015 mm (0.0006 in) max.**

**NOTE:** This is the maximum allowable difference between the thickness measurements.

4. If the disc is beyond the limits for parallelism, refinish the rotor with an on-car brake lathe. The Kwik-Lathe produced by Kwik-Way Manufacturing Co. and the "Front Brake Disc Lathe" offered by Snap-on Tools Co. are approved for this operation.

**Max: Refinishing Limit: 19.0 mm (0.75 in)**

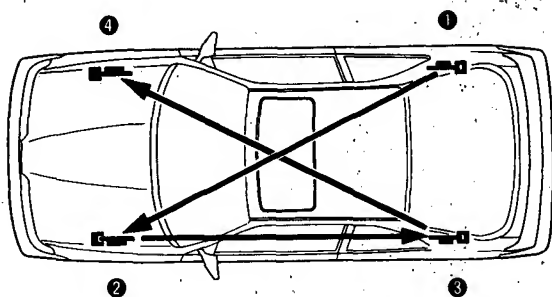
# Bleeding

## CAUTION

- Make sure all parts are clean before reassembly.
- Use only clean DOT 3 or 4 brake fluid.
- Do not allow dirt or other foreign matter to contaminate the brake fluid.
- Do not mix different brands of brake fluid.
- Avoid spilling brake fluid on painted, plastic or rubber surfaces as it can damage the finish.
- Wash spilled brake fluid off immediately with clean water.

NOTE: The reservoir on the master cylinder must be full at the start of bleeding procedure, and checked after bleeding each wheel cylinder. Add fluid as required. Use only DOT 3 or 4 brake fluid.

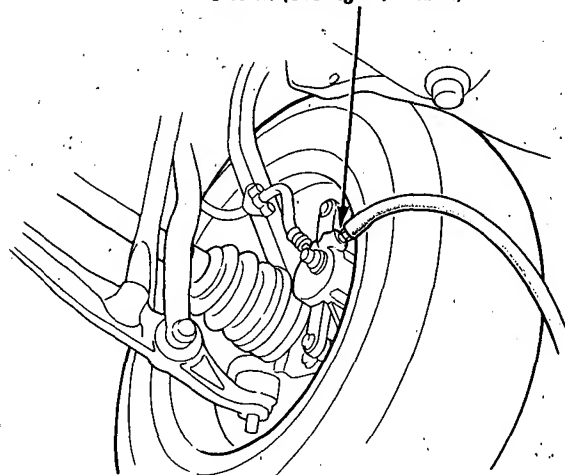
## Bleeding Sequence



1. Have someone slowly pump the brake pedal several times, then apply steady pressure.
2. Loosen the brake bleed screw to allow air to escape from the system. Then tighten the bleed screw securely.
3. Repeat the procedure for each wheel in the sequence shown above, until air bubbles no longer appear in the fluid.
4. Check brake performance by road testing.

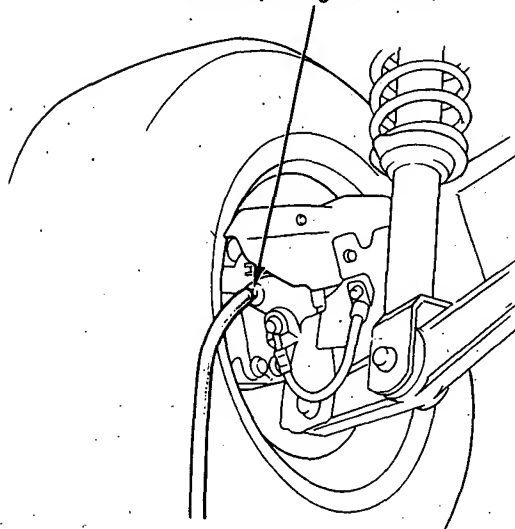
## FRONT

**FRONT BLEED SCREW**  
9 N·m (0.9 kg-m, 7 lb-ft)



## REAR

**REAR BLEED SCREW**  
9 N·m (0.9 kg-m, 7 lb-ft)



# Brake Booster



## Testing

### Functional Test

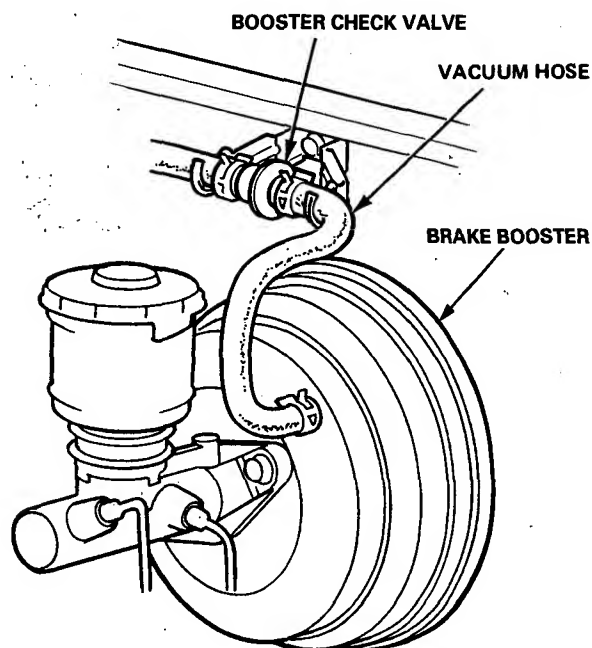
1. With the engine off, depress the brake pedal several times, then depress the pedal hard and hold that pressure for 15 seconds. If the pedal sinks, a brake line, a wheel cylinder, or the master cylinder is faulty.
2. Start the engine with the pedal depressed. If the pedal sinks slightly, the vacuum booster is working. If the pedal height does not vary, the booster or check valve is faulty.

### Leak Test

1. Depress the brake pedal with the engine running, then stop the engine. If the pedal height does not vary while depressed for 30 seconds, the vacuum booster is OK. If the pedal rises, the booster is faulty.
2. With the engine off, depress the brake pedal several times, using normal pressure. When the pedal is first depressed, it should be low. On consecutive applications, pedal height should gradually rise. If the pedal position does not vary, check the booster check valve.

### Check Valve Test

1. Disconnect the brake booster vacuum hose at the booster.
2. Start the engine and let it idle. There should be vacuum available. If no vacuum is available, the booster check valve is not working correctly. Replace the booster check valve and retest.



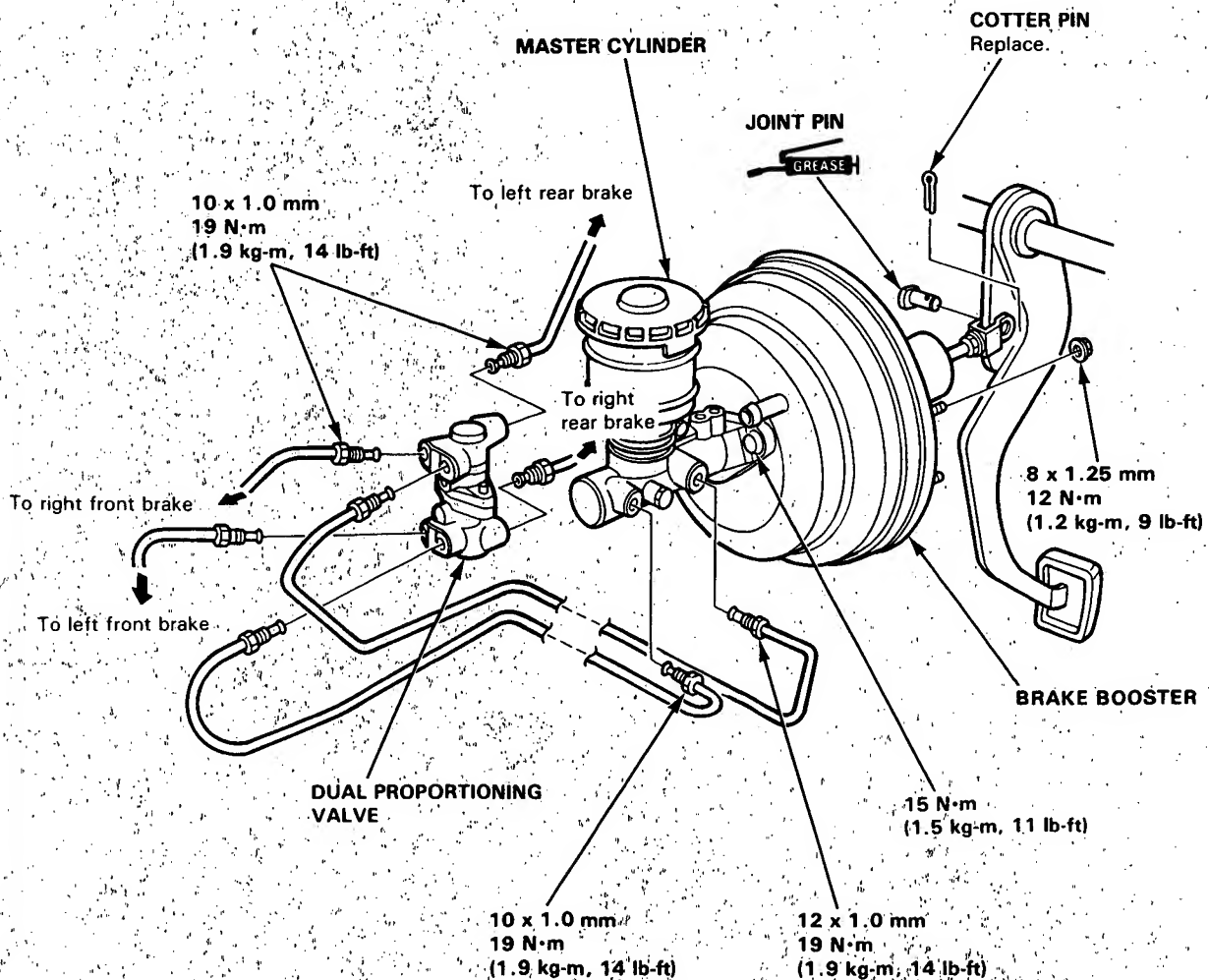
# Master Cylinder, Booster

## Removal/Installation

### CAUTION:

- Be careful not to bend or damage the brake pipes when removing the master cylinder and booster.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT-3 or 4 brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.
- Do not disassemble the master cylinder, booster and dual proportioning valve. Replace them as complete assemblies.

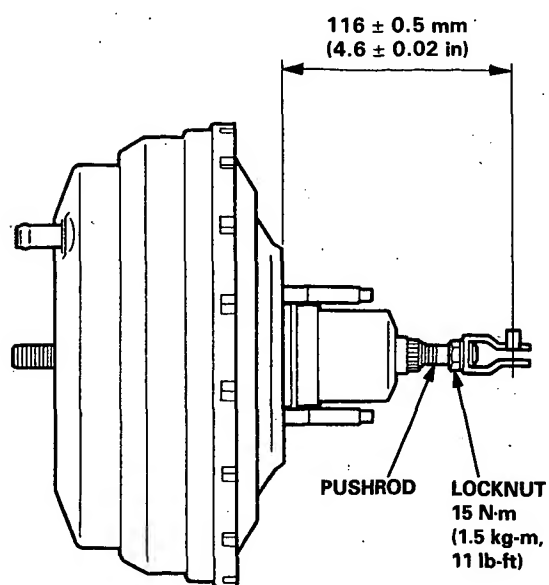
1. Drain the brake fluid from the master cylinder.
2. Disconnect the brake fluid level switch connectors.
3. Disconnect the brake pipes from the master cylinder.
4. Remove the two master cylinder mounting nuts and the master cylinder.
5. Disconnect the vacuum hose from the brake booster.
6. Remove the vacuum hose bracket.
7. GSR only: Loosen the alternator belt adjusting nut and alternator nut, move the alternator toward the engine and temporarily tighten the nuts.
8. GSR only: Remove the three 6 mm bolts attaching the power steering pipes to the left side frame.
9. Remove the cotter pin and joint pin.
10. Remove the four booster mounting nuts and the booster.







11. Adjust the pushrod length as shown.



12. Install the brake booster onto the engine compartment bulkhead and tighten the mounting nuts.

13. GSR model only: Adjust the alternator belt (see Charging System in Section 23).

14. Install the removed parts in the reverse order of removal.

**NOTE:** Before installing the master cylinder, check and adjust the pushrod clearance.

15. After installation, check and adjust the brake pedal height (see page 19-4).

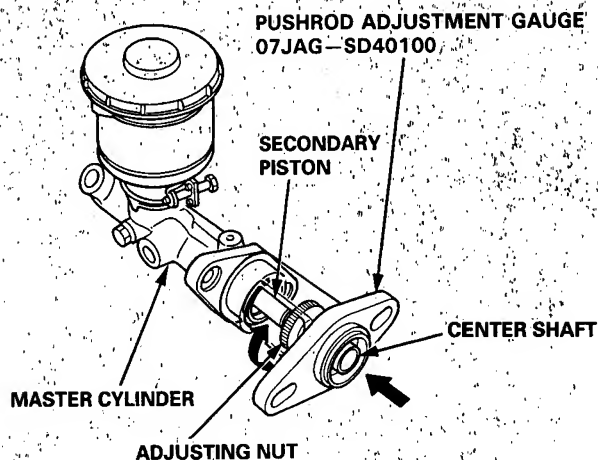
16. Fill and bleed the brake system (see page 19-10).

# Master Cylinder, Booster

## Pushrod Clearance Adjustment

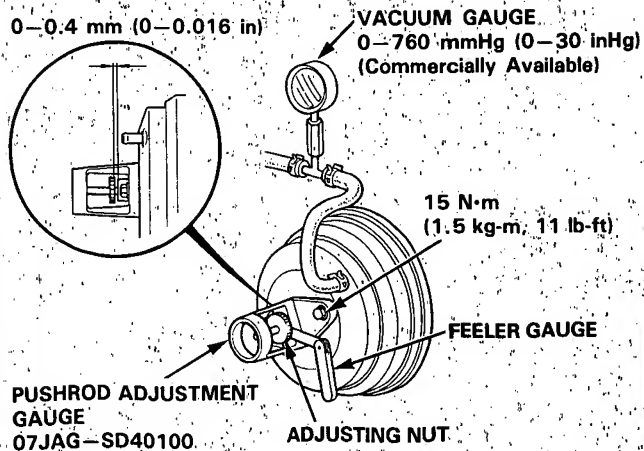
**NOTE:** Master cylinder pushrod-to-piston clearance must be checked and adjustments made, if necessary, before installing master cylinder.

1. Set the special tool on the master cylinder body; push in the center shaft until the top of it contacts with the end of the secondary piston by turning the adjusting nut.



2. Without disturbing the center shaft's position, install the special tool upside down on the booster.
3. Install the master cylinder nuts and tighten to the specified torque.
4. Connect the booster in-line with a vacuum gauge 0 — 760 mmHg (0 — 30 inHg) to the booster's engine vacuum supply, and maintain an engine speed that will deliver 500 mmHg (20 inHg) vacuum.
5. With a feeler gauge, measure the clearance between the gauge body and the adjusting nut as shown.

Clearance: 0—0.4 mm (0—0.02 in)



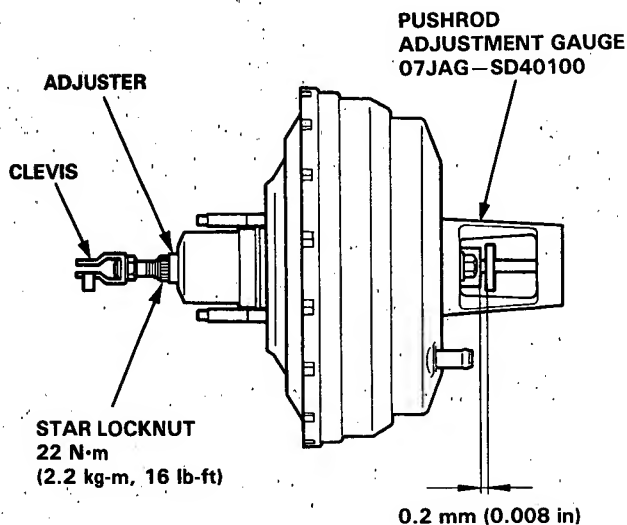
**NOTE:** If the clearance between the gauge body and adjusting nut is 0.4 mm (0.02 in), the pushrod-to-piston clearance is 0 mm. However, the clearance between the gauge body and adjusting nut is 0 mm, the pushrod-to-piston clearance is 0.4 mm (0.02 in) or more. Therefore, it must be adjusted and re-checked.

6. If clearance is incorrect, loosen the star locknut and turn the adjuster in or out to adjust. The clearance should be adjusted 0.2 mm (0.008 in).

**NOTE:**

- Adjust the clearance while the specified vacuum is applied to the booster.
- Hold the clevis while adjusting.

7. Tighten the star locknut securely.
8. Remove the special tool and install a new master cylinder rod seal in the booster.



9. If the booster was removed, adjust the pushrod length (see page 19-13).
10. Install the master cylinder (see page 19-12).
11. After installation, perform the following inspections and adjust if necessary.
  - Brake pedal height (see page 19-4)
  - Brake pedal free play (see page 19-4)

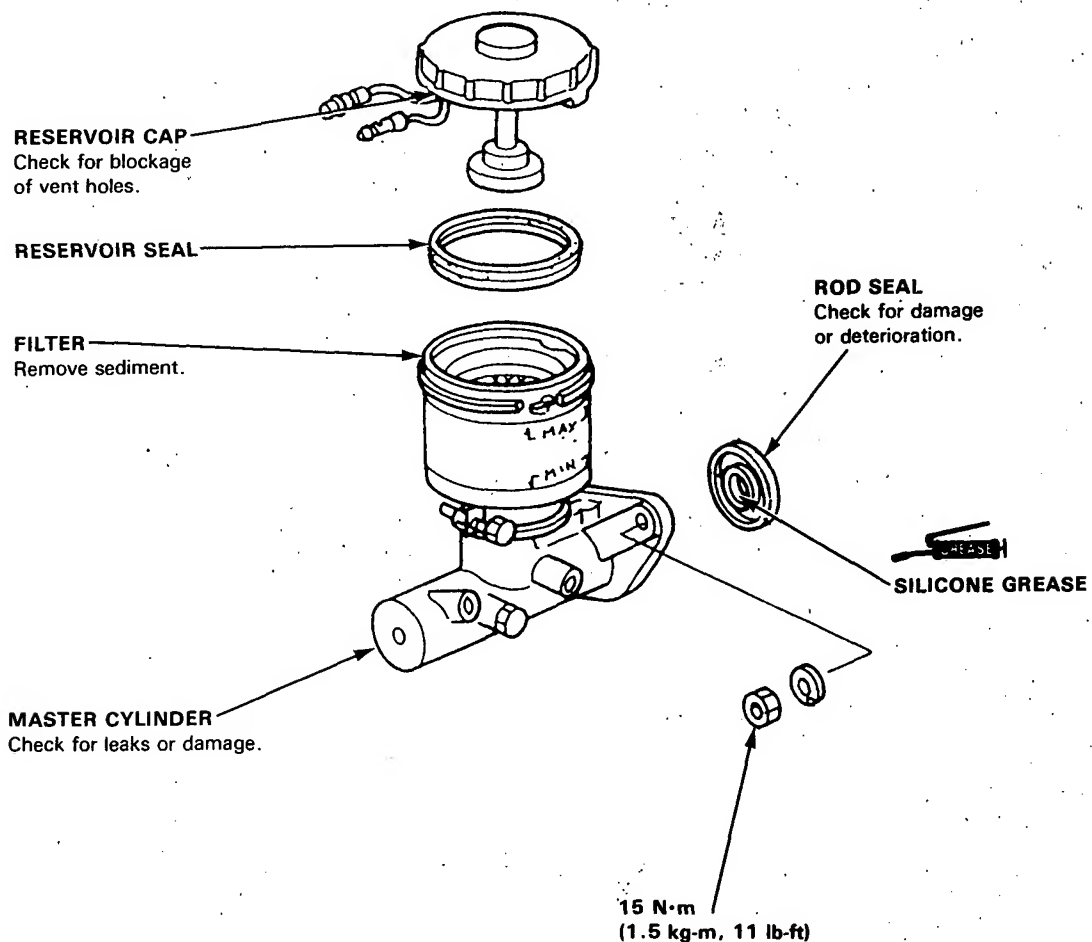
# Master Cylinder



## Inspection

### CAUTION:

- Be careful not to bend or damage the brake pipes when removing the master cylinder.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Do not try to disassemble the parts in the master cylinder assembly. Replace the master cylinder assembly with a new part if necessary.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.



# Rear Brakes

## Inspection

**WARNING** Do not use an air hose to blow the brake assembly clean. Use an OSHA-approved vacuum cleaner, to avoid breathing brake dust.

### CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.



BRAKE CYLINDER GREASE (P/N 08733-B020E)  
OR EQUIVALENT RUBBER GREASE

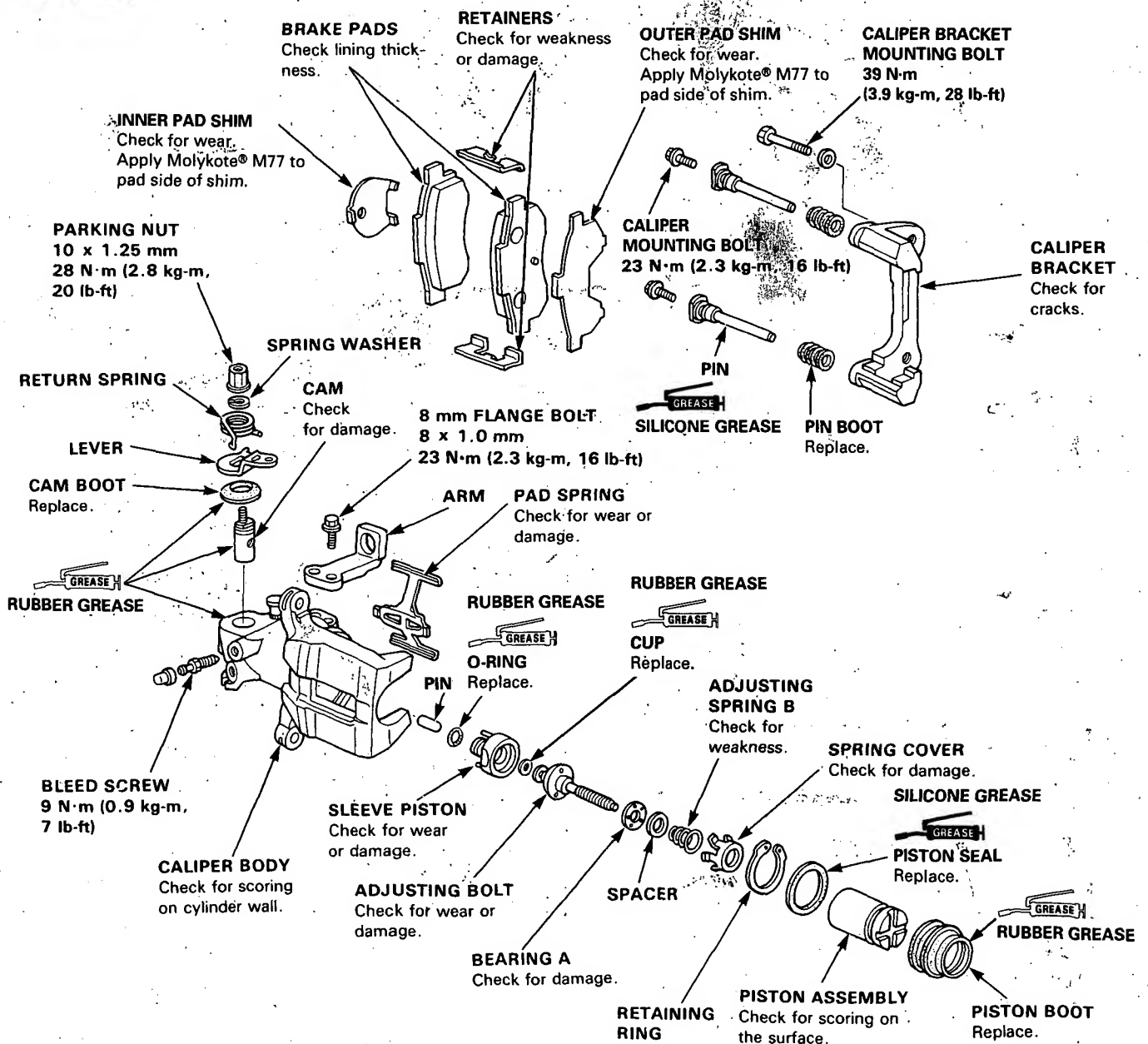


SILICONE GREASE

- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid.
- Use only clean DOT 3 or 4 brake fluid.

### NOTE:

- Coat piston, piston seal, and caliper bore with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.

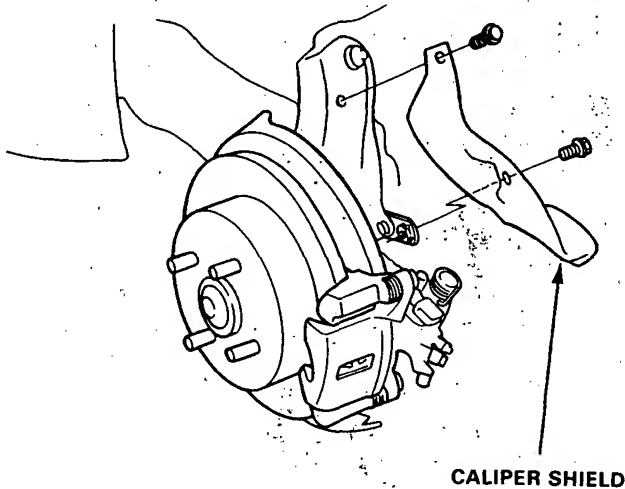


# Rear Brake Pad/Disc

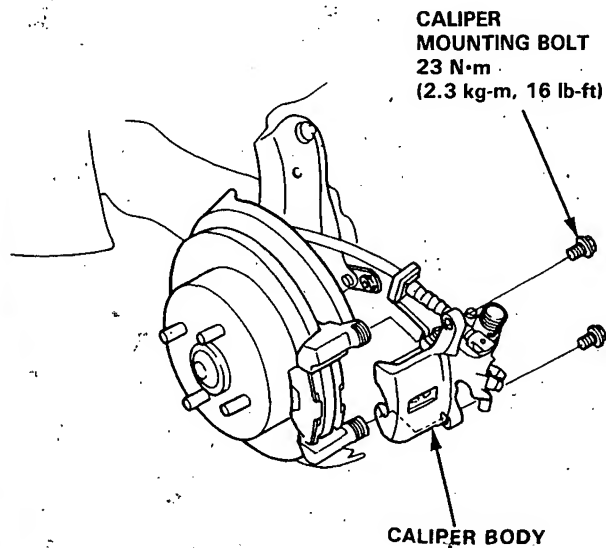


## Inspection and Replacement

1. Block the front wheels, support the rear of the car on safety stands, then remove the rear wheels.
2. Remove the caliper shield.



3. Remove the two caliper mounting bolts and the caliper body from the bracket.

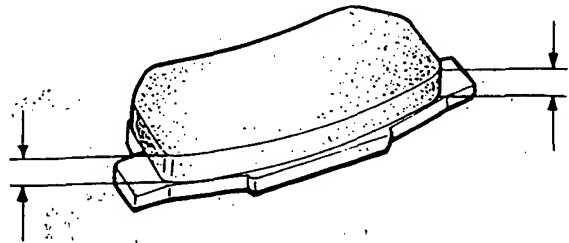


4. Remove the pads and measure the thickness of each brake pad lining using a vernier caliper.

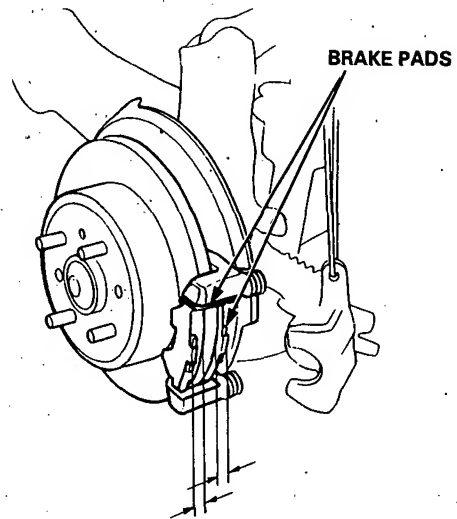
### Brake Pad Thickness:

Standard: 7.5 mm (0.30 in)

Service Limit: 1.6 mm (0.06 in)



5. If the lining thickness is less than service limit, replace the brake pads as a set.



(cont'd)

# Rear Brake Pad/Disc

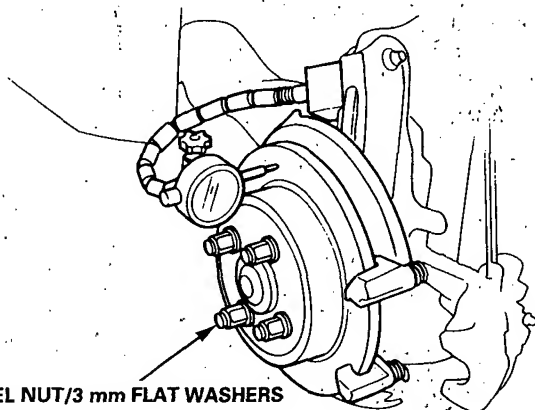
## Inspection and Replacement (cont'd)

6. Inspect the disc surface for grooves, cracks, and rust. Clean the disc thoroughly and remove all rust.
7. Mount a dial indicator as shown and measure the runout at 10 mm (0.4 in) in from the outer edge of the disc.

**CAUTION:** Use wheel nuts and 3 mm thick flat washers to hold the disc securely.

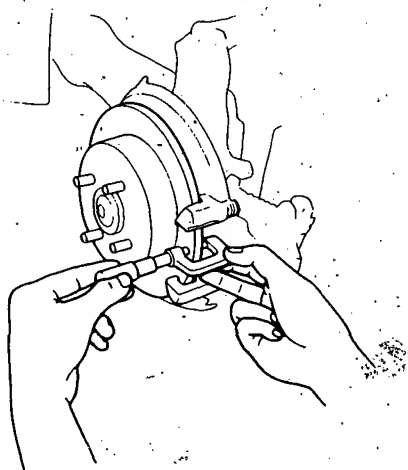
**Brake Disc Run-out;  
Service Limit: 0.15 mm (0.006 in)**

8. Resurface or replace the brake disc if beyond the service limit.



**WHEEL NUT/3 mm FLAT WASHERS**  
110 N·m  
(11 kg-m, 80 lb-ft)

9. Using a micrometer, measure the rear brake disc thickness at eight points, approximately 45° apart and 10 mm (0.4 in) in from the outer edge of the disc.



10. Replace the disc if it is less than the service limit for thickness.

### Brake Disc Thickness:

**Standard: 9.0 mm (0.35 in)**

**Service Limit: 8.0 mm (0.31 in)**

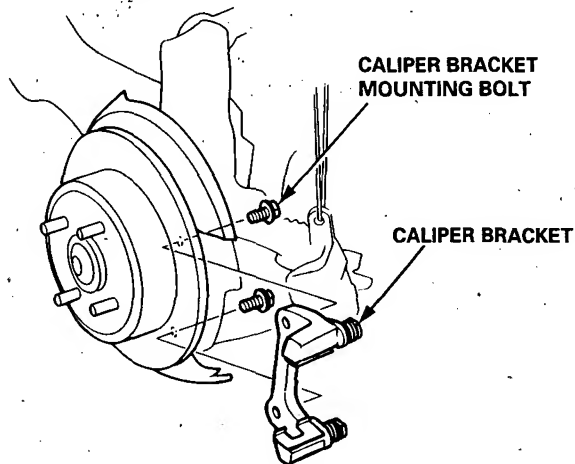
**Brake Disc Parallelism: 0.015 mm (0.0006 in) max.**

**NOTE:** This is the maximum allowable difference between the thickness measurements.

11. Resurface or replace the brake disc if beyond the limit for parallelism.

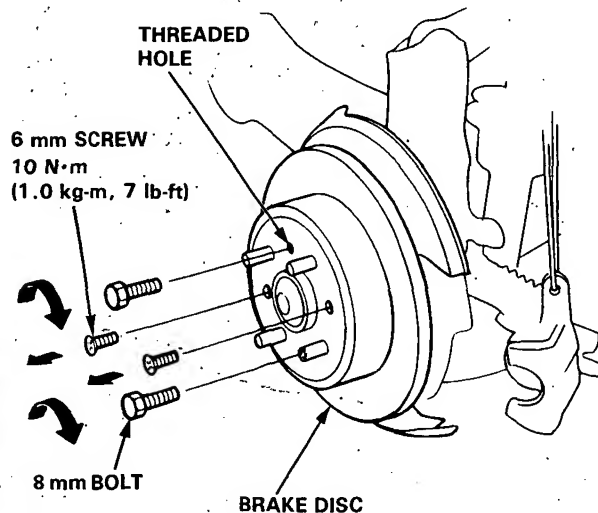
**NOTE:** A new disc should be resurfaced if its runout is greater than 0.15 mm (0.006 in).

12. Remove the two caliper bracket mounting bolts and caliper bracket.



13. Remove the two 6 mm screws and brake disc.

**NOTE:** If the brake disc is difficult to remove, install 8 mm bolts into the threaded holes and tighten them.



**THREADED HOLE**

**6 mm SCREW**  
10 N·m  
(1.0 kg-m, 7 lb-ft)

**8 mm BOLT**

**BRAKE DISC**



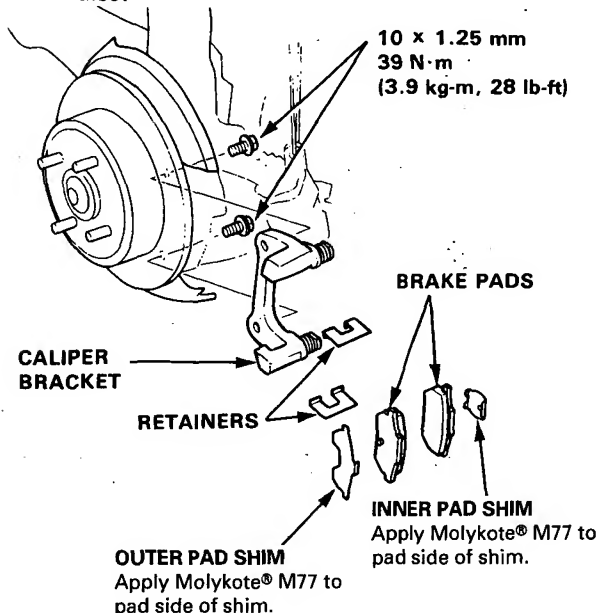
# Rear Caliper

## Disassembly

14. Install the new or resurfaced brake disc.
15. Clean the caliper bracket and retainers, then install the caliper bracket with two bolts and retainers. Install the new brake pads and pad shims onto the caliper bracket.

### ⚠ WARNING

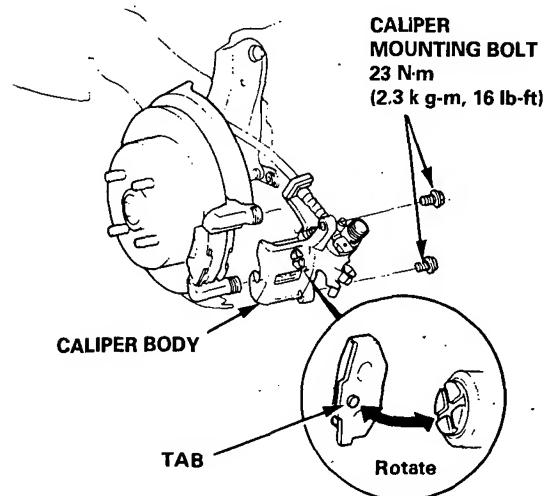
- Contaminated brake pads or disc reduce stopping power. Keep grease or oil off the brake pads or disc.



16. Rotate the caliper piston clockwise into place in the cylinder, then align the cutout in the piston with the tab on the inner pad by turning the piston back.

**CAUTION:** Lubricate the boot with silicone grease to avoid twisting the piston boot. If the piston boot is twisted, back it out so it sits properly.

17. Install the caliper body.



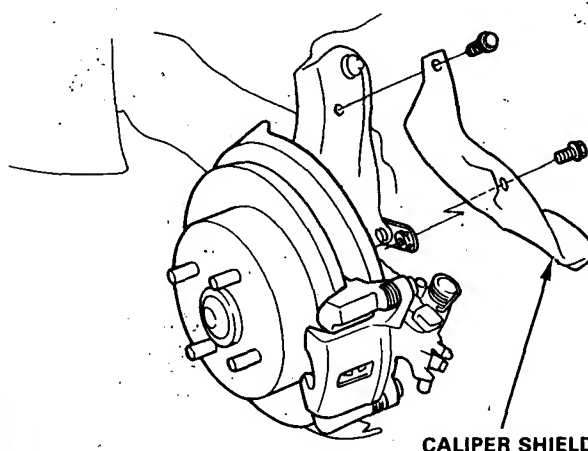
### ⚠ WARNING

- Never use an air hose or dry brush to clean brake assemblies.
- Use an OSHA-approved vacuum cleaner to avoid breathing brake dust.

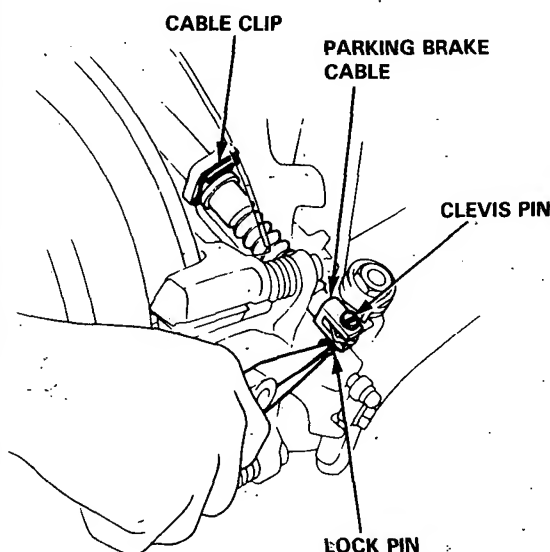
### CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.

1. Remove the caliper shield.



2. Remove the lock pin and clevis pin. Remove the cable clip and disconnect the cable from the arm.

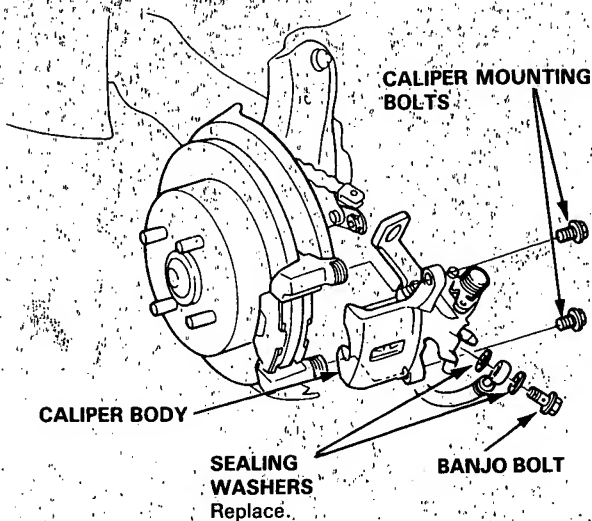


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# Rear Caliper

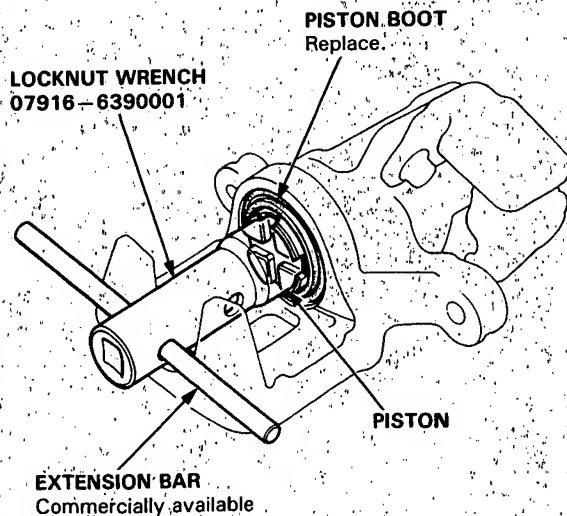
## Disassembly (cont'd)

3. Remove the banjo bolt and two sealing washers.
4. Remove the two caliper mounting bolts and caliper body from the bracket.



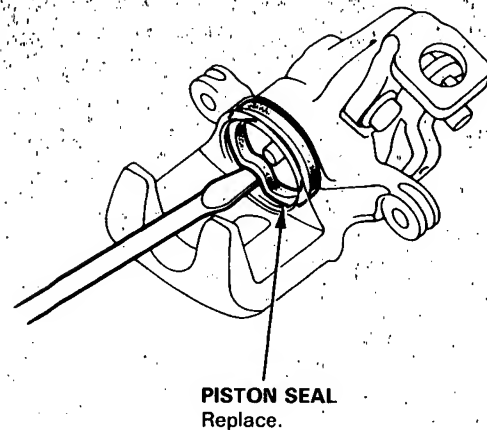
5. Remove the pad spring from the caliper body.
6. Remove the piston by rotating the piston counterclockwise with the locknut wrench and remove the piston boot.

**CAUTION:** Avoid damaging the piston.



7. Remove the piston seal.

**CAUTION:** Take care not to damage the cylinder bore.

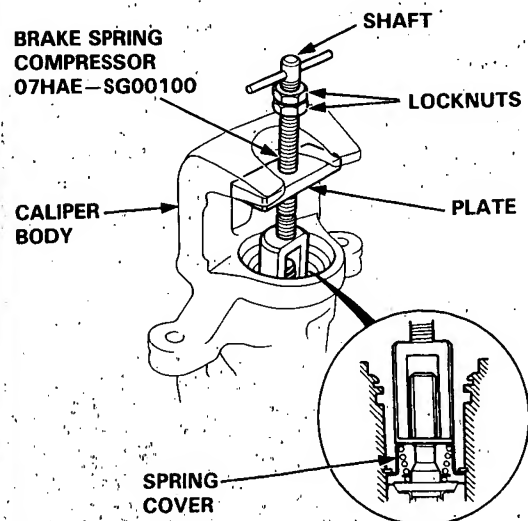


8. Install the brake spring compressor between the caliper body and spring cover.

**CAUTION:** Be careful not to damage the inside of the caliper cylinder during caliper disassembly.

9. Position the locknuts as shown, then turn the shaft until the plate just contacts the caliper body.

**NOTE:** Do not compress the spring under the spring cover.

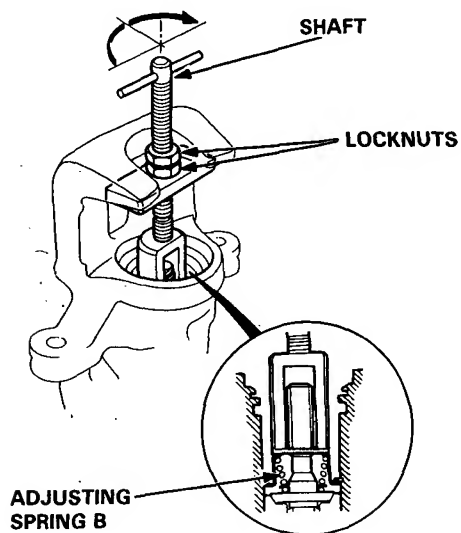






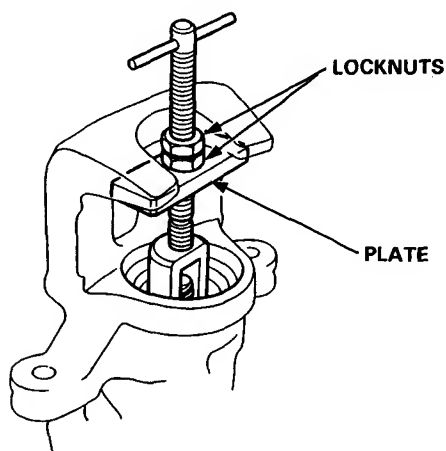
10. Turn the shaft clockwise  $1/4$ – $1/2$  turn to compress the adjusting spring B in the caliper body.

**CAUTION:** To prevent damage to the inner components, do not turn the shaft more than  $1/2$  turn.

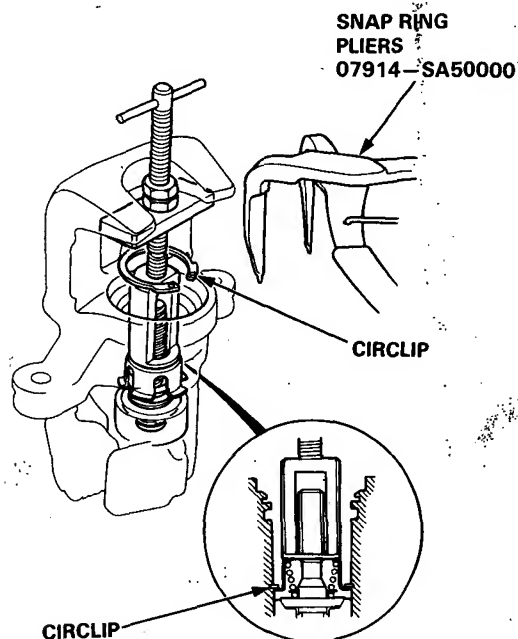


11. Lower the locknuts fully and tighten the locknuts securely.

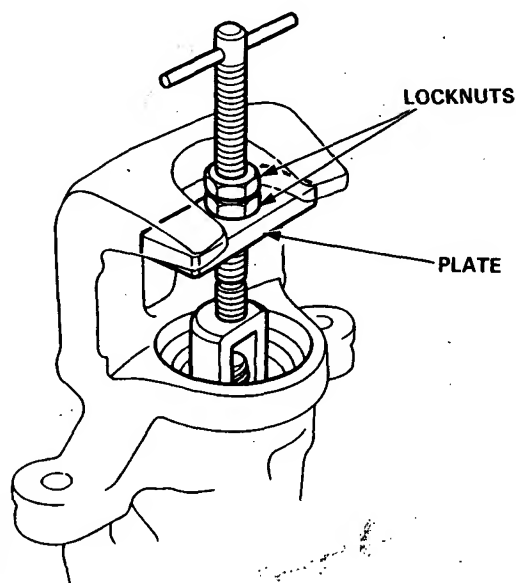
**NOTE:** Keep the locknuts in this position until you reinstall the retaining ring.



12. Remove the circlip with snap ring pliers.



13. Hold the plate with your fingers and turn the shaft counterclockwise. Then, remove the brake-spring compressor from the caliper.

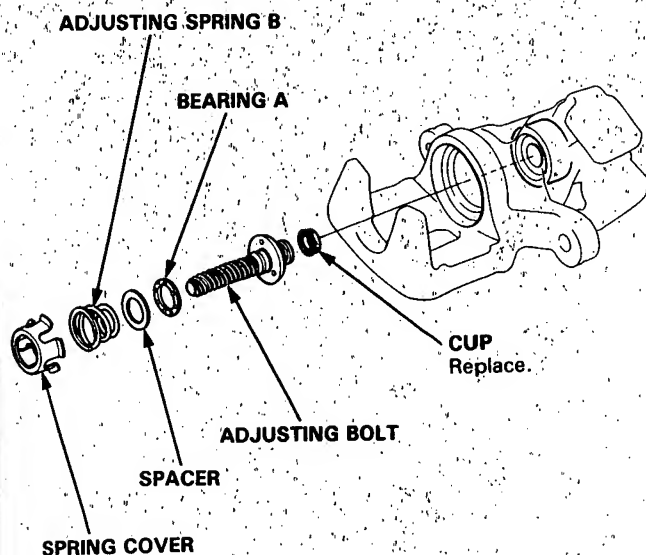


# Rear Caliper

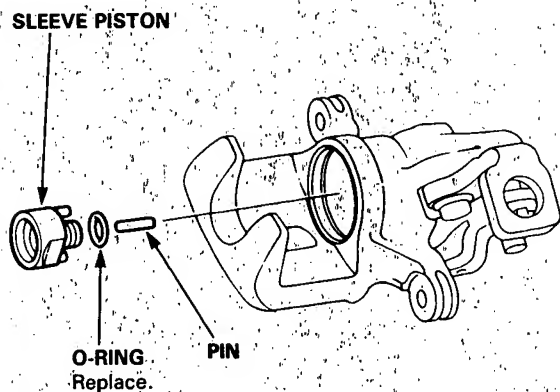
## Disassembly (cont'd)

14. Remove the adjusting bolt.

15. Remove the spring cover, adjusting spring B, spacer, bearing A and cup from the adjusting bolt.



16. Remove the sleeve piston, and remove the pin from the cam.

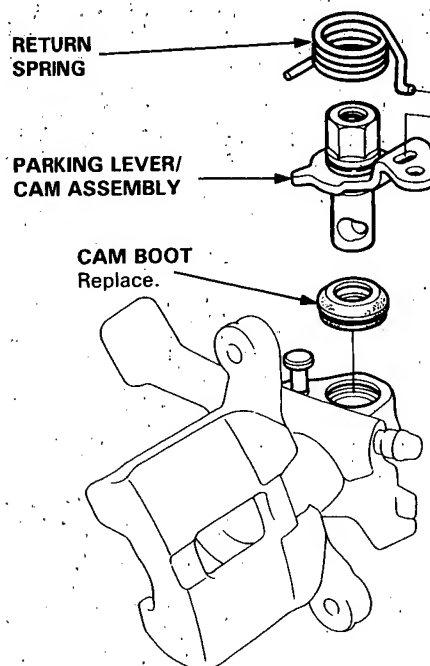


17. Remove the return spring.

18. Remove the parking lever and cam as an assembly from the caliper body.

**CAUTION:** Do not loosen the parking nut with the cam installed in the caliper body. If the lever and shaft must be separated, hold the lever in a vise and loosen the parking nut.

19. Remove the cam boot.



# Rear Caliper



## Reassembly

### CAUTION:

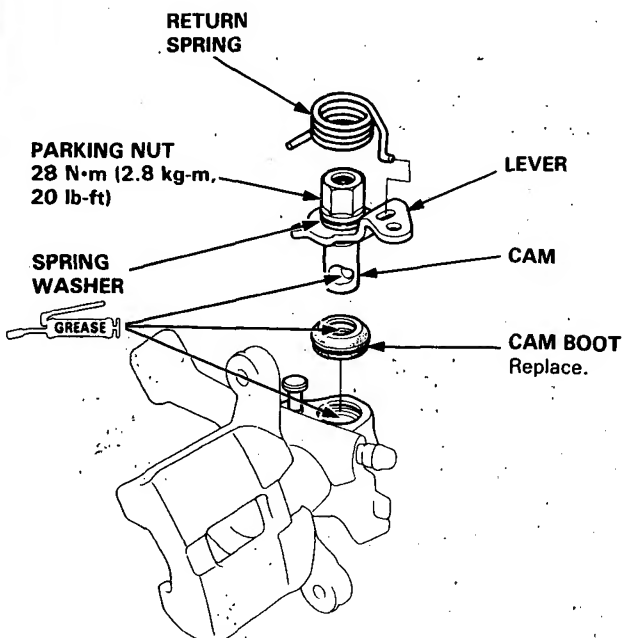
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

1. Pack all cavities of the needle bearing with commercially available assembly lube.
2. Coat the new cam boot with commercially available assembly lube and install it in the caliper body.
3. Apply commercially available assembly lube to the pin contacting area of the cam and install the cam and lever assembly into the caliper body.
4. Install the return spring.

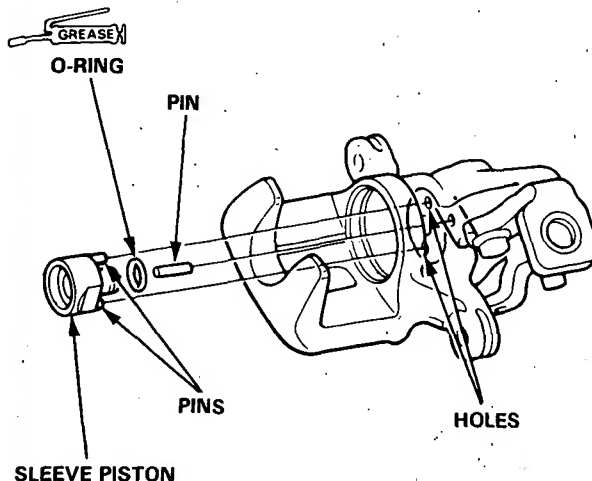
### CAUTION:

- When the cam and lever were separated, be sure to assemble them before installing the cam in the caliper body. Install the lever and spring washer, apply locking agent to the threads, and tighten the parking nut while holding the lever with a vise.
- Avoid damaging the cam boot since it must be installed before the cam.
- When installing the cam, do not allow the cam boot lips to turn outside in.

 : Commercially available assembly lube



5. Install the pin in the cam.
6. Install a new O-ring on the sleeve piston.
7. Install the sleeve piston so the hole in the bottom of the piston is aligned with the pin in the cam, and two pins on the piston are aligned with the holes in the caliper.



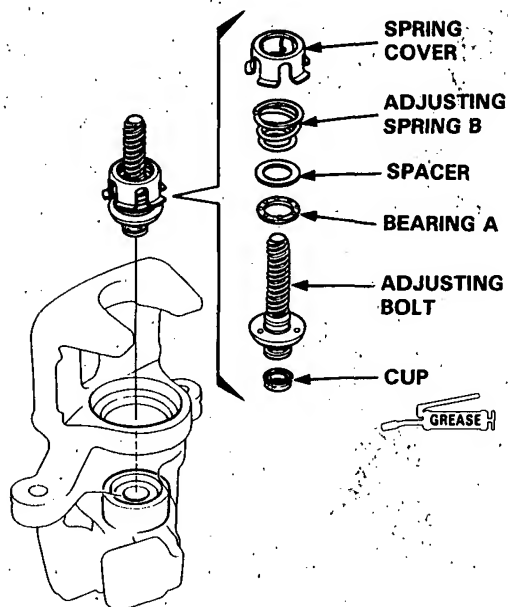
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# Rear Caliper

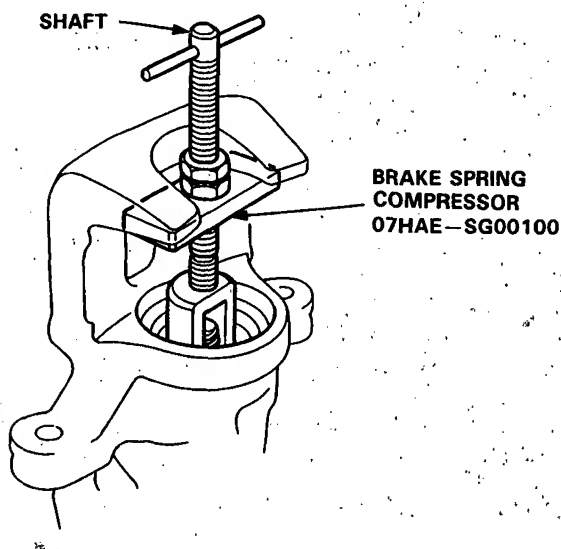
## Reassembly (cont'd)

8. Coat a new cup with Brake Cylinder Grease (P/N: 08733-B020E) or equivalent rubber grease, and install it with its groove facing the bearing A side on the adjusting bolt.

9. Fit the bearing A, spacer, adjusting spring B and spring cover on the adjusting bolt, and install them in the caliper cylinder.



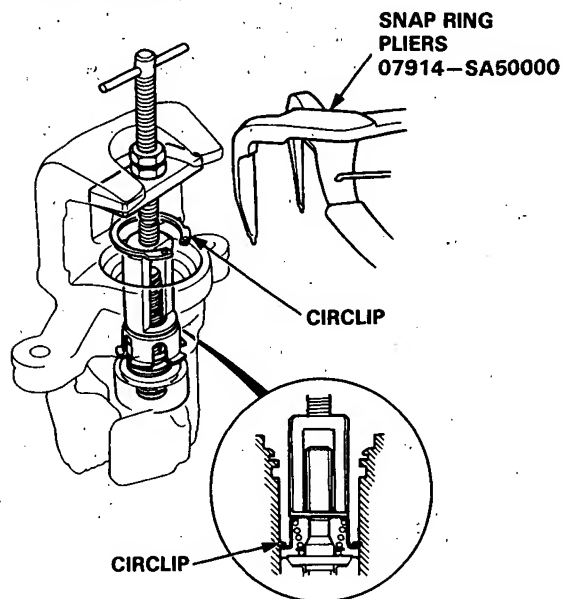
10. Install the brake spring compressor on the spring cover and turn the shaft until the locknut contacts the plate.



11. Check that the flared end of the spring cover is below the circlip groove.

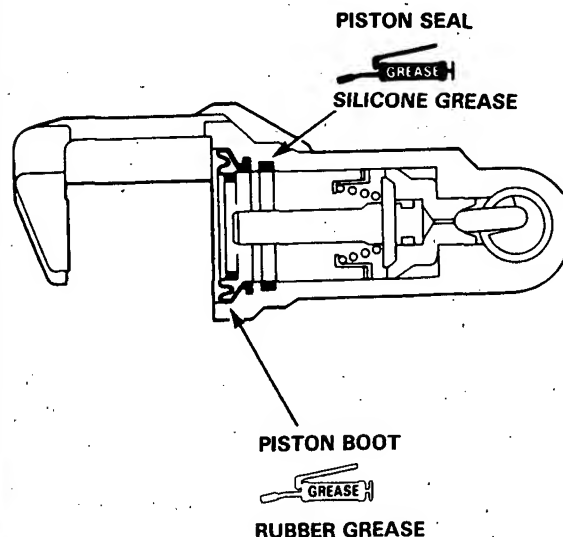
12. Install the circlip in the groove, then remove the special tool.

NOTE: Check that the circlip is seated in the groove properly.



13. Coat a new piston seal with silicone grease and install it in the caliper.

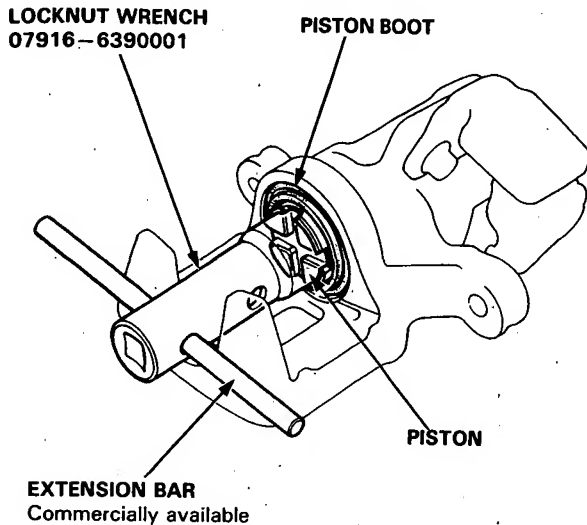
14. Apply Brake Cylinder Grease (P/N: 08733-B020E) or equivalent rubber grease to the sealing lips and inside of a new piston boot, and install it in the caliper.



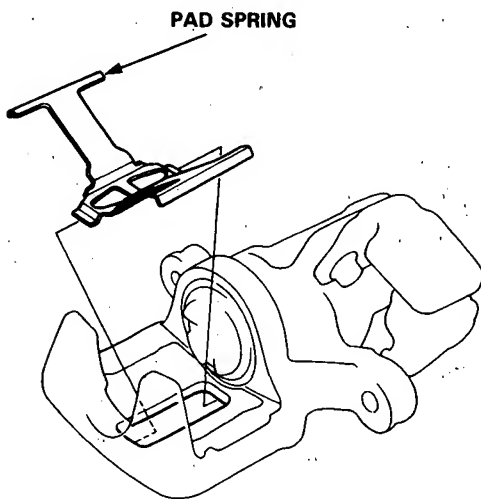


15. Coat the outside of the piston with brake fluid and install it on the adjusting bolt while rotating it clockwise with the locknut wrench.

**CAUTION:** Avoid damaging the piston and piston boot.



16. Install the pad spring on the caliper.



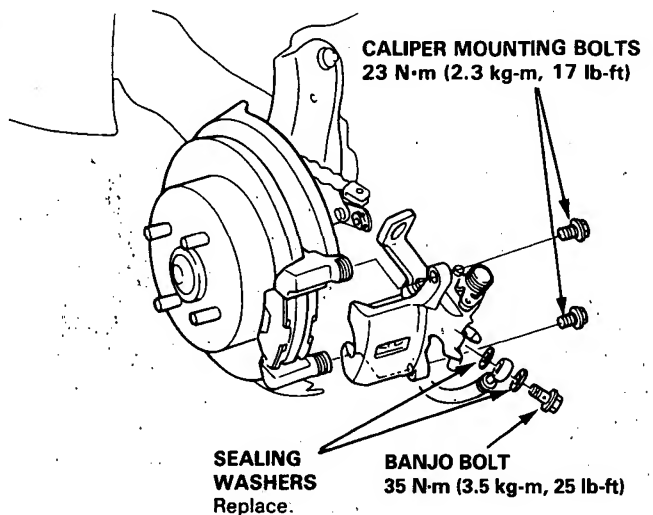
17. Install the brake pad retainers and brake pads.

**⚠ WARNING** Always reinstall the brake pads in their original positions to prevent loss of braking efficiency.

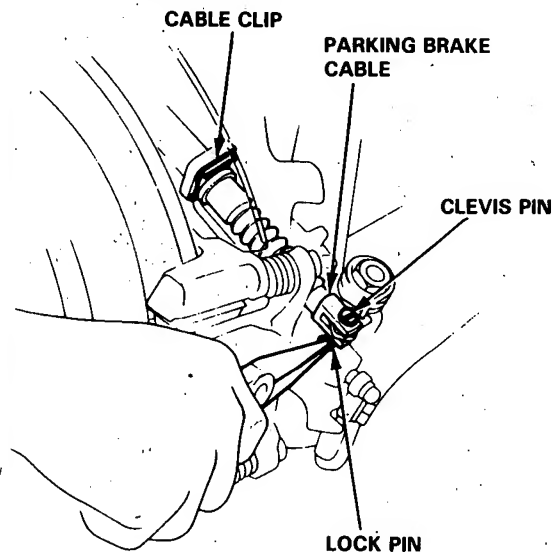
18. Align the cutout in the piston with the tab on the inner pad (see page 19-19).

19. Install the caliper on the caliper bracket and tighten the caliper mounting bolts.

20. Connect the brake hose to the caliper with new sealing washers and tighten the banjo bolt.



21. Insert the cable through the arm and connect the cable to the lever with the clevis pin and lock pin. Install the cable clip securely.



22. Fill the brake reservoir up and bleed the brake system (see page 19-10).

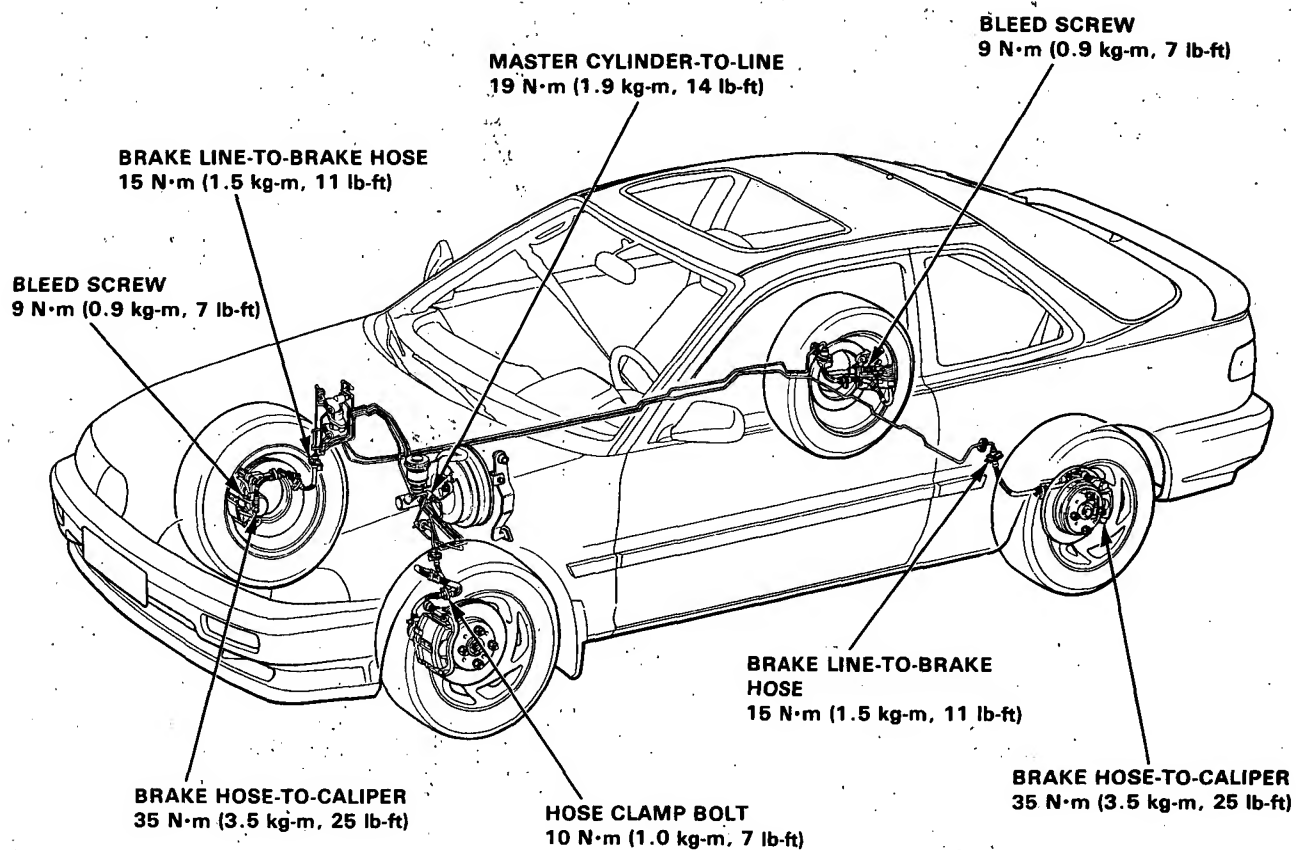
23. Operate the brake pedal several times, then adjust the parking brake (see page 19-4).

24. Install the caliper shield and tighten the bolts.

# Brake Hoses/Pipes

## Inspection

1. Inspect the brake hoses for damage, leaks, interference or twisting.
2. Check the brake lines for damage, tipping, rusting or leakage. Also check for bent brake lines.
3. Check for leaks at hose and line joints or connections, and retighten if necessary.



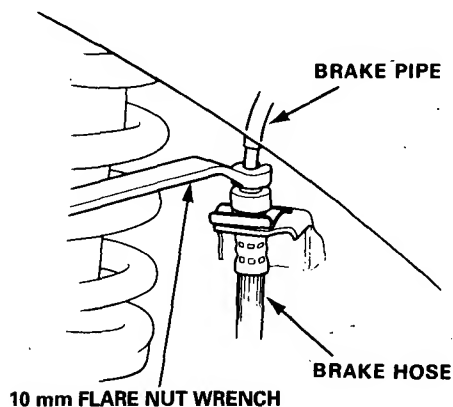


## Brake Hoses Replacement

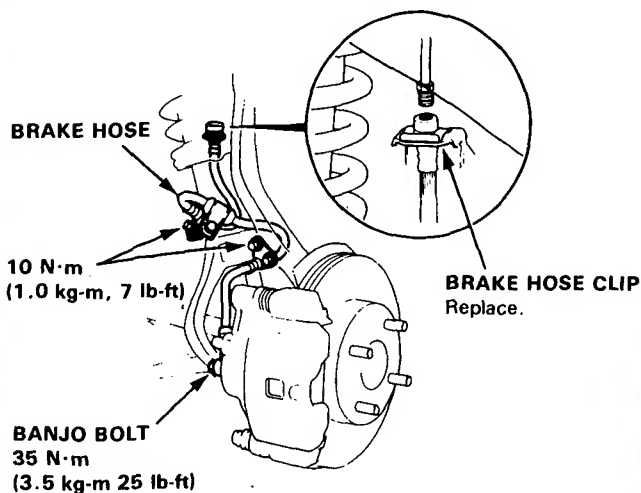
### CAUTION:

- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Use only clean DOT 3 or 4 brake fluid.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not spill brake fluid on the car, it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.

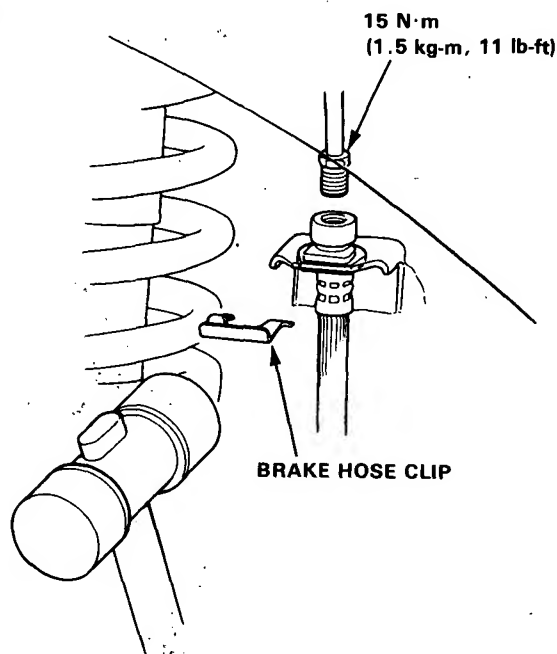
1. Replace the brake hose if the hose is twisted, cracked or if it leaks.
2. Disconnect the brake hose from the brake pipe using a 10 mm flare nut wrench.



3. Remove and discard the brake hose clip from the brake hose.
4. Remove the banjo bolt and disconnect the brake hose from the caliper.



5. Install a new brake hose clip to the brake hose.
6. Connect the brake pipe to the brake hose.

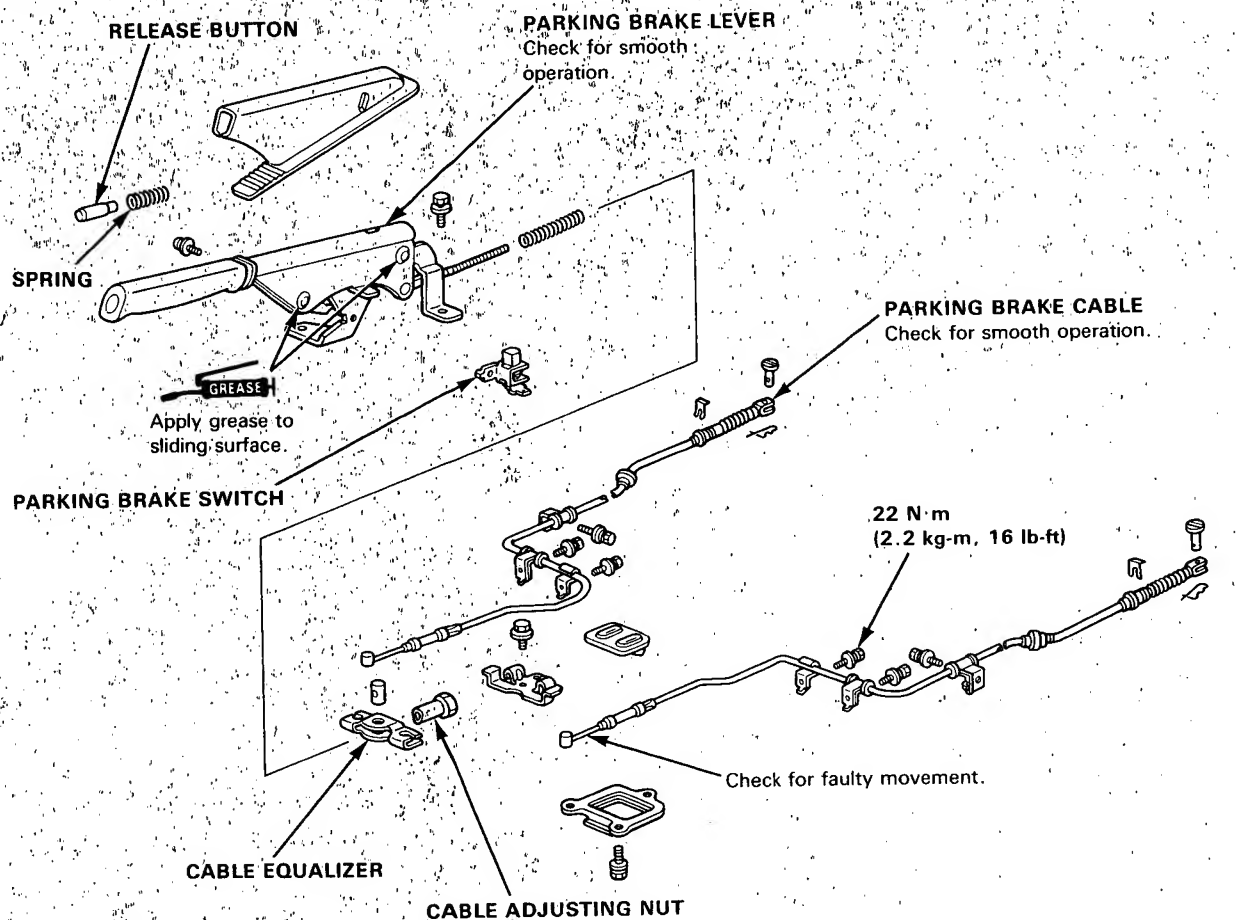


7. Connect the brake hose to the caliper.
8. Install the brake hose on the knuckle and damper mounting clamp.
9. After installing the brake hose, check the hose and line joints for leaks, and tighten if necessary.

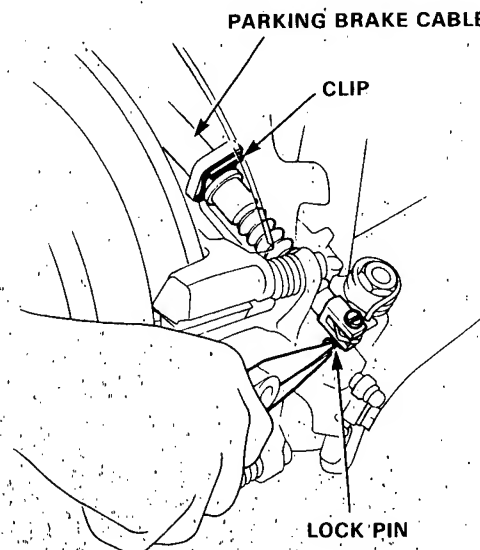
# Parking Brake

## Disassembly and Reassembly

**CAUTION:** The parking brake cables must not be bent or distorted. This will lead to stiff operation and premature cable failure.



Disconnect the parking brake cable from the lever on the caliper by removing the lock pin.





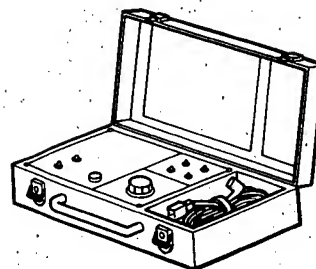
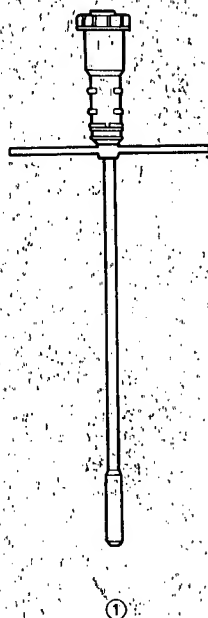
## Anti-lock Brake System (ABS)

Special Tools .....	19-30	Solenoids	
Illustrated Index .....	19-31	Leak Test .....	19-70
Description .....	19-32	Removal .....	19-71
Circuit Diagram .....	19-44	Inspection .....	19-71
Wiring/Connector Locations .....	19-46	Installation .....	19-72
ALB Checker		Power Unit .....	19-73
Function Test .....	19-47	Accumulator .....	19-74
Wheel Sensor Signal		Index/Inspection .....	19-74
Confirmation .....	19-49	Accumulator/Pressure	
Troubleshooting		Switch Removal .....	19-75
ALB Indicator Light .....	19-50	Accumulator Disposal .....	19-75
Symptom-to-System Chart .....	19-52	Master Cylinder	
Flowchart .....	19-53	Inspection .....	19-76
Hydraulic System		Bleeding .....	19-77
Hydraulic Connections .....	19-67	Electronic Components	
Relieving Accumulator/		Control Unit Replacement .....	19-78
Line Pressure .....	19-68	Relays Inspection .....	19-78
Modulator/Solenoid Unit		Pulsers/Sensors	
Index/Inspection .....	19-69	Inspection .....	19-79
		Replacement .....	19-80

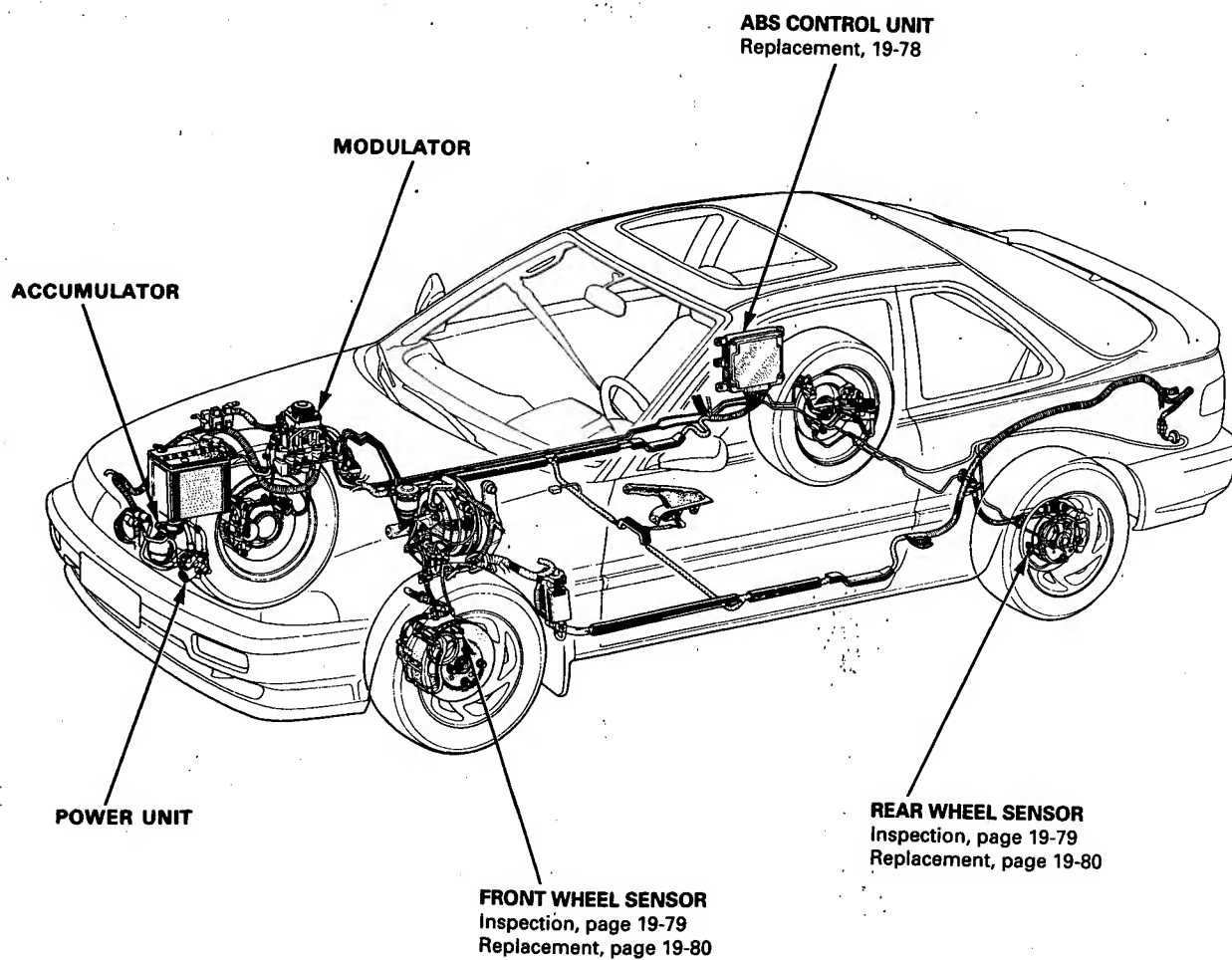


# Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07HAA — SG00101 or 07HAA — SG00100	Bleeder T-Wrench	1	19-55, 19-68, 19-70, 19-77
②	07HAJ — SG0010B or 07HAJ — SG00100	ALB. Checker (USA)	1	19-47, 19-49, 19-70, 19-77
	07HAJ — SG00200	ALB. Checker (Canada)	1	19-47, 19-49, 19-70, 19-77



# Illustrated Index



# Description

## Features/Construction/Operation

In a conventional brake system, if the brake pedal is depressed excessively, the wheels can lock before the vehicle comes to a stop. In such a case, the stability of the vehicle is reduced if the rear wheels are locked, and maneuverability of the vehicle is reduced if the front wheels are locked, creating an extremely unstable condition.

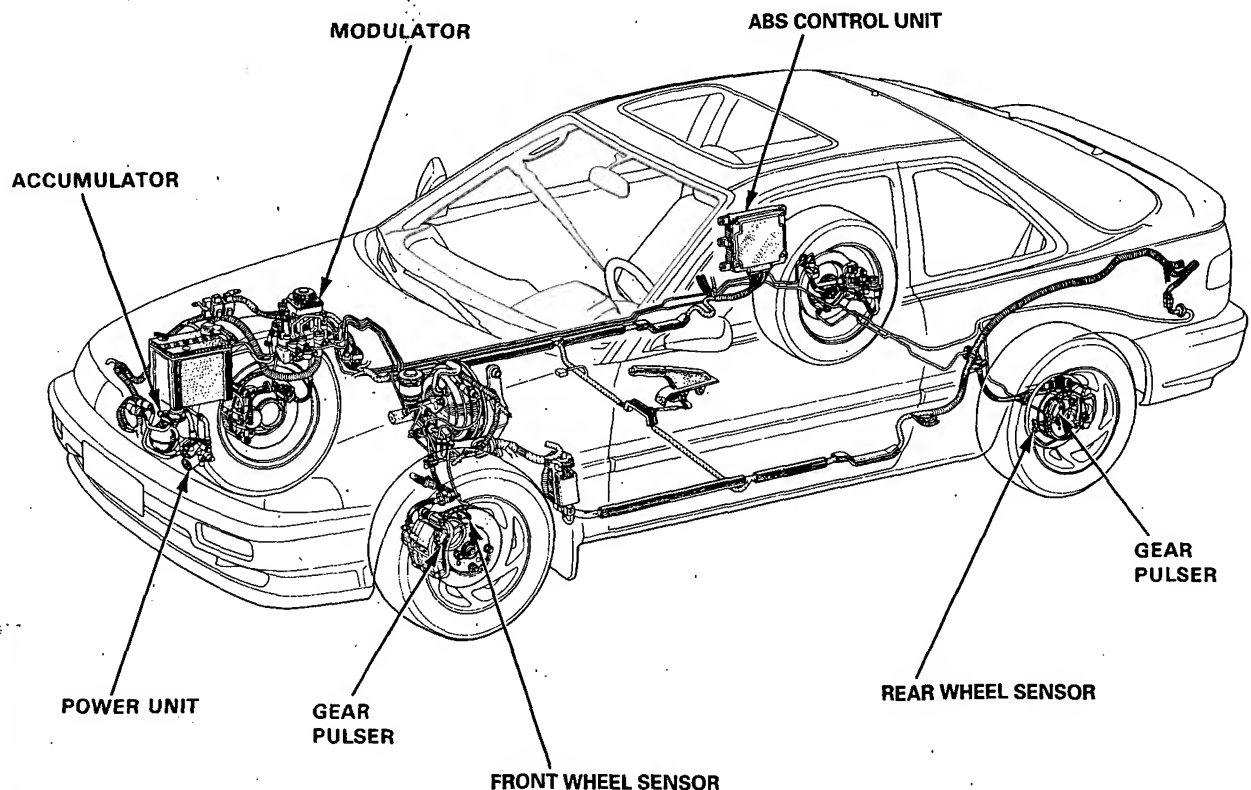
The Anti-lock Brake System (ABS) modulates the pressure of the brake fluid applied to each front caliper or both rear calipers, thereby preventing the locking of the wheels, whenever the wheels are likely to be locked due to excessive braking. It then restores normal hydraulic pressure when there is no longer any possibility of wheel locking.

### Features

- Increased braking stability can be achieved regardless of changing driving conditions.
- The maneuverability of the vehicle is improved as the system prevents the front wheels from locking.
- When the anti-lock brake system goes into action, a kickback is felt on the brake pedal.
- The anti-lock brake system is equipped with a self-diagnosis function. When an abnormality is detected, the ABS indicator light comes on and the LED display on the ABS control unit blinks. The location of the system's trouble can be diagnosed from the frequency of the LED display blinks.
- This system has individual control of the front wheels and common control ("select Low") for the rear wheels. "Select Low" means that the rear wheel that would lock first (the one with the lowest resistance to lock-up) determines anti-lock brake system activation for both rear wheels.
- The system has a fail-safe function that allows normal braking if there's a problem with the anti-lock brake system.

### Construction

In addition to the conventional braking system, the anti-lock brake system consists of: gear pulsers attached to the rotating part of individual wheels; wheel sensors, which generate pulse signals in correspondence to the revolution of the gear pulsers; ABS control unit, which controls the working of the anti-lock brake system by performing calculations based on the signals from the individual wheel sensors and the individual switches; modulator unit, which adjusts the hydraulic pressure applied to each caliper on the basis of the signals received from the ABS control unit; an accumulator, in which high pressure brake fluid is stored, a pressure switch, which detects the pressure in the accumulator and transmits signals to the ABS control unit; a power unit, which supplies the high-pressure working fluid to the accumulator by means of a pump; a motor relay for driving the power unit; a fail-safe relay, which cuts off the solenoid valve ground circuit when the fail-safe device is at work; an ABS indicator light.



## Master Cylinder

### 1. Construction

A tandem master cylinder is used to improve braking system safety. In addition, center valves are used so as to match the anti-lock brake system operation.

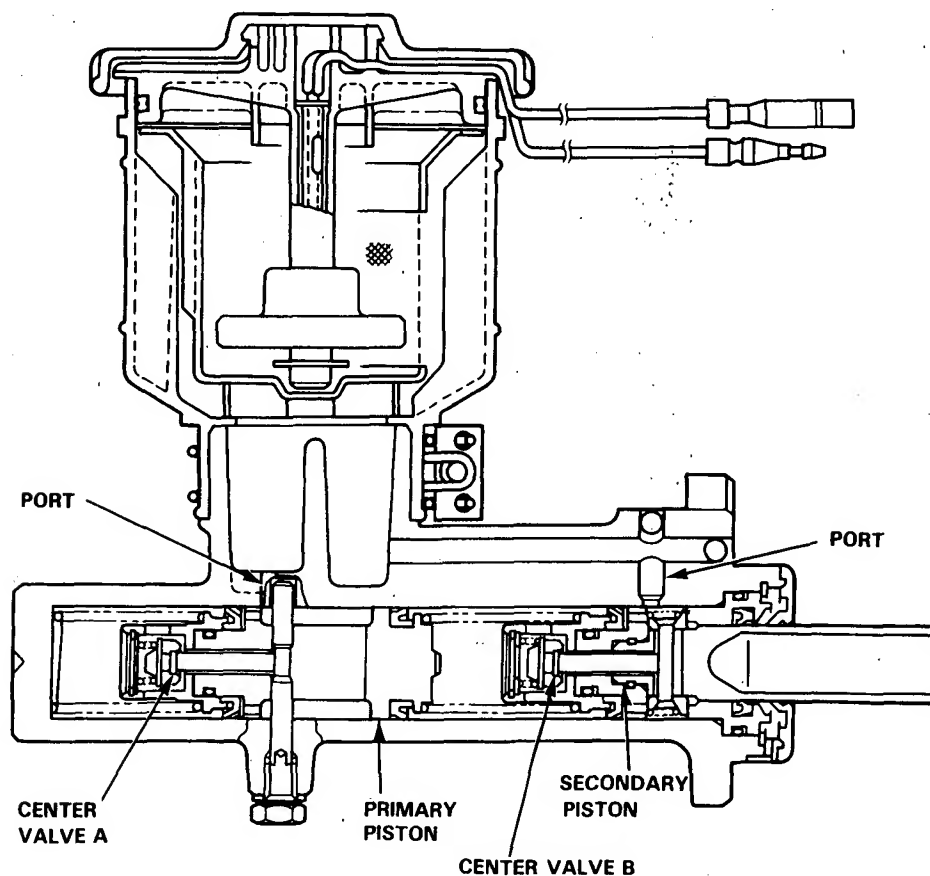
The master cylinder has one reservoir tank which is connected to the cylinder sections by two small holes. It has two pistons; primary and secondary, which are criss-cross connected with the calipers so that the fluid pressure works separately on each system (front right wheel & rear left wheel, and front left wheel & rear right wheel).

A stop bolt for controlling movement of the primary piston is provided at the side of the master cylinder body. A reed switch for detecting the brake fluid volume is also provided on the cap of the reservoir tank.

### 2. Operation

When the brake pedal is depressed, the secondary piston is pushed through the brake booster and the center valve B is closed so that the fluid pressure is generated on the secondary side. At the same time, the primary piston is pushed by the secondary fluid pressure and the center valve A is closed so that braking fluid pressure is generated both on the primary and secondary sides.

When the brake pedal is released, the primary and secondary pistons are returned to the original position by the brake fluid pressure and piston spring.



(cont'd)

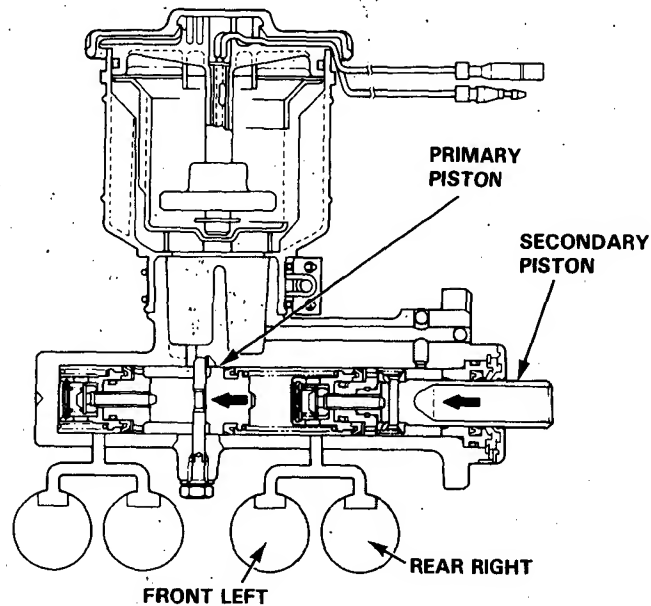
## Description

### Features/Construction/Operation (cont'd)

### 3. Responses when fluid is leaking

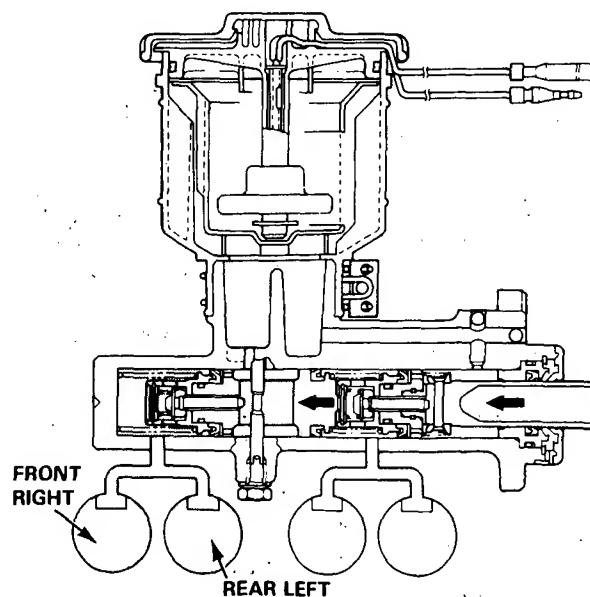
- (1) In case of leaking from the primary system:

Since the fluid pressure on the primary side does not rise, the primary piston is pushed by the fluid pressure of the secondary piston and the tension of the piston spring until the end hits on the cylinder, the braking is performed by the fluid pressure on the secondary side.



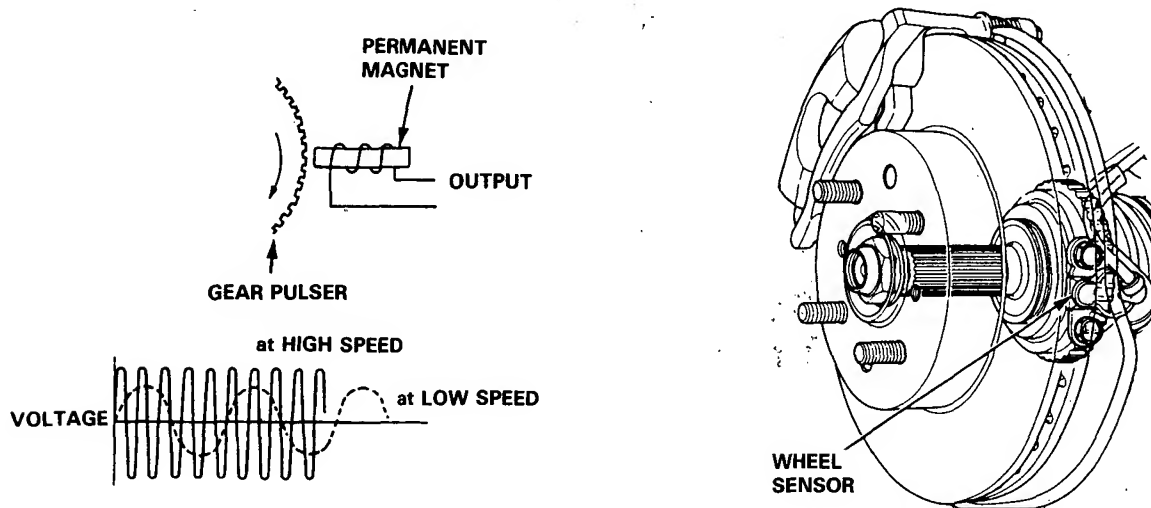
- (2) In case of leaking from the secondary system:

The secondary piston does not produce fluid pressure, keeps moving ahead, hits on the end surface of the primary piston so that the primary piston is pushed under the same condition as an ordinary rod. Therefore, the braking is conducted by the fluid pressure on the primary side.



### Wheel Sensor

The wheel sensor is contactless type and it detects the rotating speeds of a wheel. It consists of a permanent magnet and coil. When the gear pulsers attached to the rotatory parts of each wheel (front wheel: outboard joint of the driveshaft, rear: hub bearing unit) turn, the magnetic flux around the coil in the wheel sensor alternates, generating voltages with frequency in proportion to wheel rotating speed. These pulses are sent to the ABS control unit and the ABS control unit identifies the wheel speeds.



### ABS Control Unit

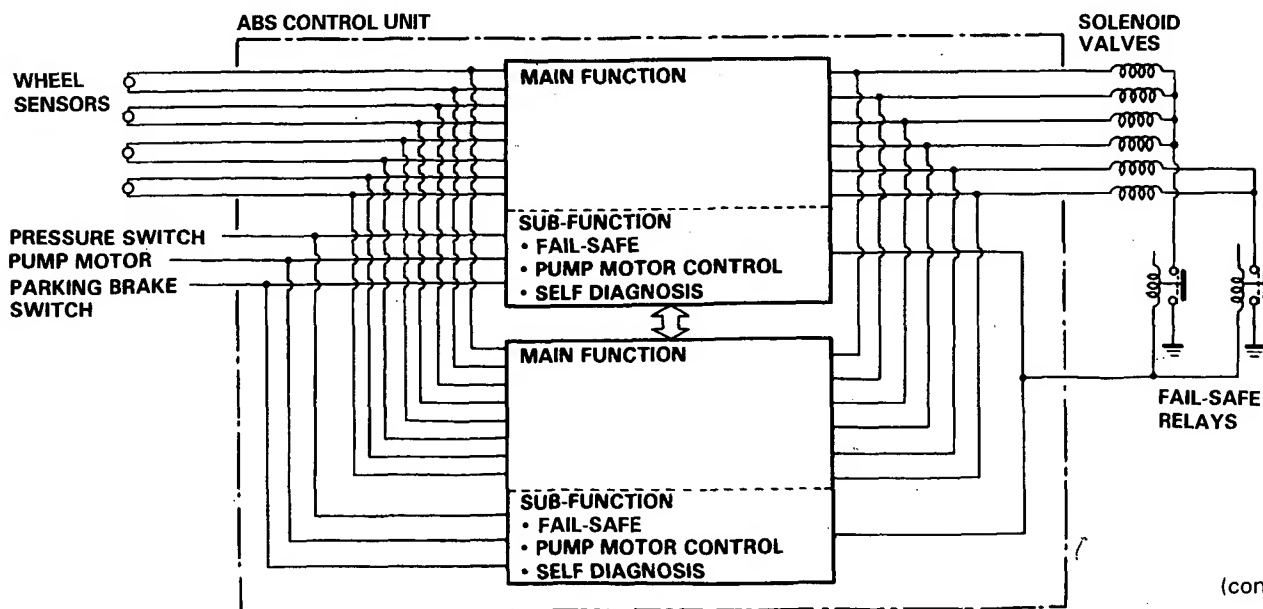
The ABS control unit consists of a main function section, which controls the operation of anti-lock brake system, and sub-function, which controls the pump motor and "self-diagnosis."

#### 1. Main Function

The main function section of the ABS control unit performs calculations on the basis of the signals from each wheel sensor and controls the operation of the anti-lock brake system by putting into action the solenoid valves in the modulator unit for each front brake and for the two rear brakes.

#### 2. Sub-Function

The sub-function section gives driving signals to the pump motor and also gives "self-diagnosis" signals, necessary for backing up the anti-lock brake system.



(cont'd)

# Description

## Features/Construction/Operation (cont'd)

### 1. Self-Diagnostic Function

Since the anti-lock brake system modulates the braking pressure when a wheel is about to lock, regardless of the driver's intention, the system operation and the braking power will be impaired if there is a malfunction in the system. To prevent this possibility, at speeds above 6 mph (10 km/h), the self diagnosis function, provided in the sub-function of the ABS control unit, monitors the main system functions. When an abnormality is detected, the ABS indicator light goes on.

There is also a check mode of the self-diagnosis system itself; when the ignition switch is first turned on, the ABS indicator light comes on and stays on for a few seconds after the engine starts, to signify that the self-diagnosis system is functional.

### 2. Fail-Safe Function

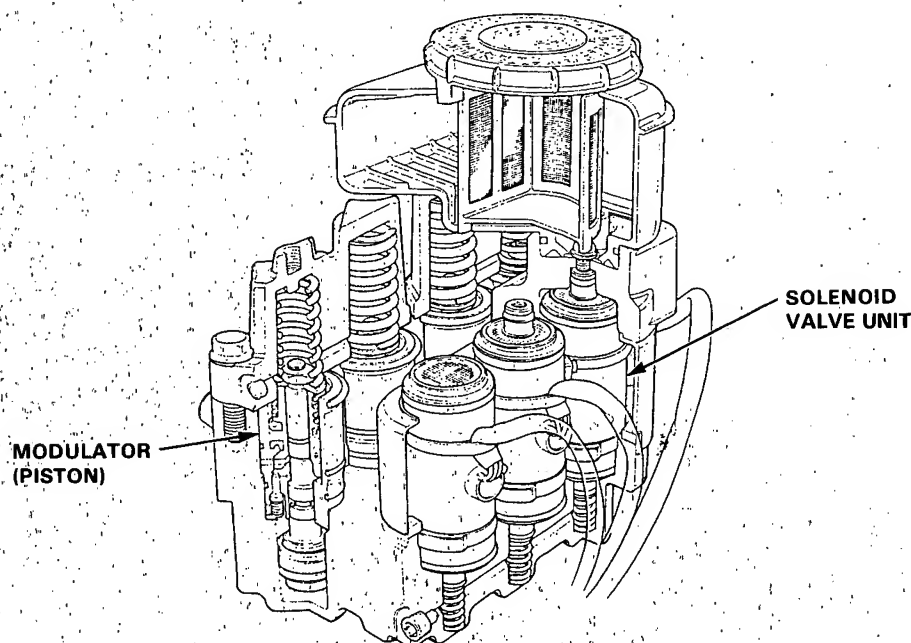
When abnormality is detected in the ABS control system by the self-diagnosis, the solenoid operations are suspended by turning off the relay (fail-safe relay) which disconnects the ground circuits of all the solenoid valves to inhibit anti-lock brake system operations. Under these conditions, the braking system functions just as an ordinary one, maintaining the necessary braking function. When the ABS indicator light is turned on, it means the fail-safe is functioning.

### Modulator Unit

Modulators for each wheel and solenoid valves are integrated in the modulator unit.

The modulators for front and rear brakes are of independent construction and they are positioned vertically for improved maintainability. The modulators for rear brakes are provided with a PCV function (Proportioning Control Valve) in order to prevent the rear wheels from locking when the anti-lock brake system is malfunctioning or the anti-lock brake system is not activated.

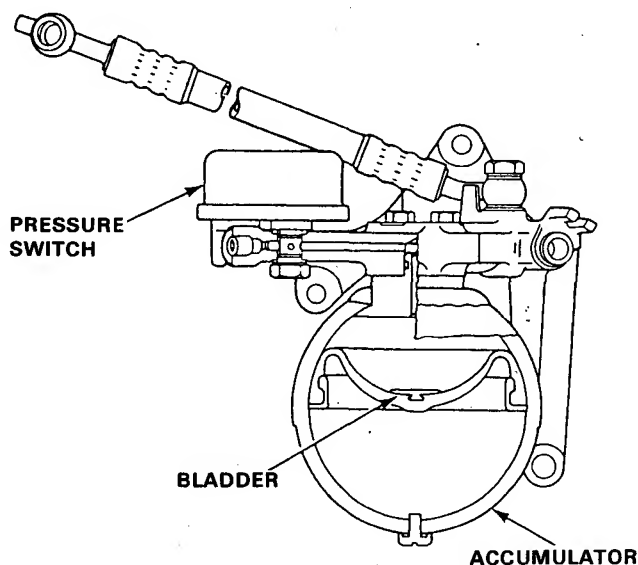
The solenoid valves feature quick response (5 ms or less). The inlet and outlet valves are integrated in the solenoid valve unit. There are three solenoid valves provided, one for each front wheel, and one for both rear wheels.





### Accumulator

The accumulator is a pneumatic type which accumulates high pressure brake fluid fed from the pump incorporated in the power unit. When the anti-lock brake system operates, the accumulator feeds high pressure brake fluid to the modulator valve via the inlet side of the solenoid valve.

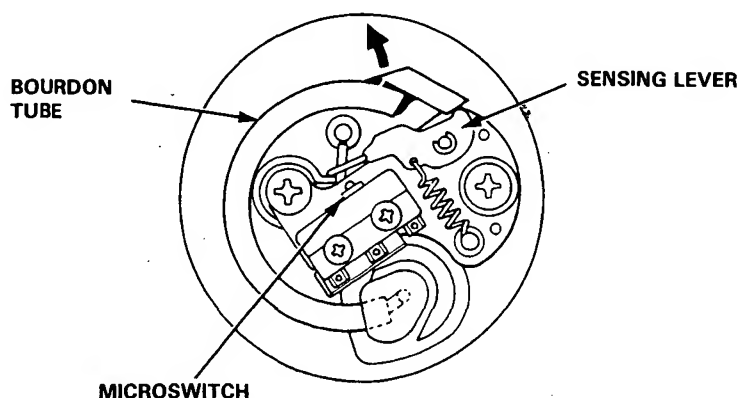


### Pressure Switch

The pressure switch monitors the pressure accumulation (pressure from the pump) in the accumulator and is turned off when the pressure becomes lower than a prescribed level. When the pressure switch is turned off, the switching signal is sent to the ABS control unit. Upon receiving the signal, the ABS control unit activates the pump motor relay to operate the motor. If the pressure doesn't reach the prescribed value, the ABS indicator light comes on.

### Operation

When the pressure in the accumulator rises, the Bourdon tube in the pressure switch deforms outwards. When the free end of the Bourdon tube moves more than the prescribed amount, the microswitch is activated by the force of the spring attached to the sensing lever. When the pressure in the accumulator decreases due to anti-lock brake system operations, the Bourdon tube moves in the direction opposite to the one described above, and the microswitch is eventually turned off. Upon receiving this signal, the ABS control unit activates the motor relay to operate the motor.



(cont'd)

# Description

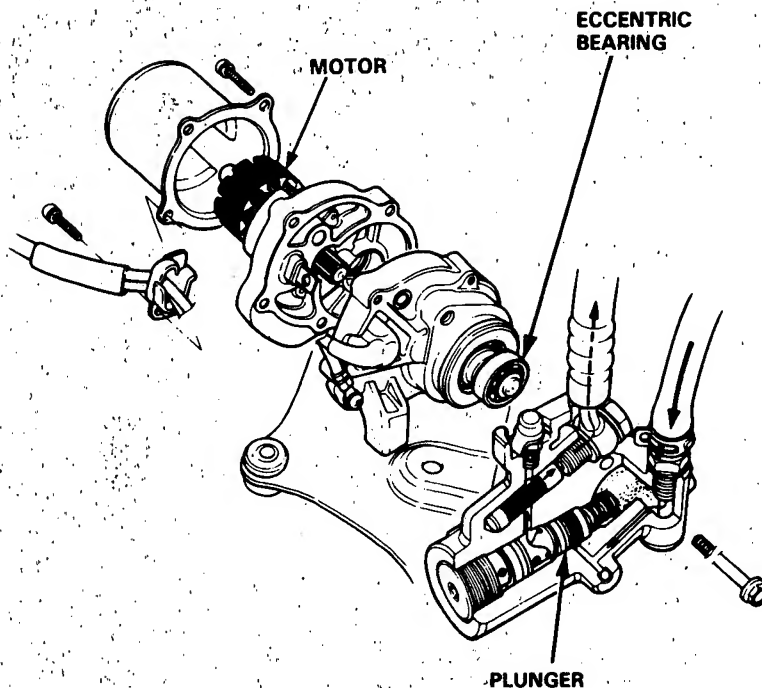
## Features/Construction/Operation (cont'd)

### Power Unit

The power unit consists of a motor and a plunger pump. Since an eccentric bearing is positioned on the end of the motor shaft, the rotation of the motor provides the reciprocating motion of the plunger. The brake fluid is thus pressurized and fed to the accumulator.

As the motor rotates more and the pressure in the accumulator exceeds the prescribed level, the pressure switch is turned on. Approx. 3 seconds after receiving the ON signal, the ABS control unit stops the motor relay operation. In this state, the pressure in the accumulator reaches 23,000 kPa (230 kg/cm<sup>2</sup>, 3,271 psi).

If the pressure doesn't reach the prescribed value after the motor has continuously operated for 120 seconds or more, the ABS control unit stops the motor and activates ABS indicator light.



### ABS Indicator Light

The ABS control unit turns on the ABS indicator light when one or more of the below described abnormalities is detected.

- When the operating time of the motor in the power unit exceeds 120 seconds.
- When vehicle running time exceeds 30 seconds without releasing the parking brake lever.
- When one of the rear wheels is locked during running.
- When absence of speed signals from any of the four wheel sensors is detected.
- When the activation time of all solenoids exceeds a given time or an open circuit is detected in the solenoid system.
- When solenoid output is not detected in the simulated anti-lock brake system operation carried out during running at speed of 6 mph (10 km/h) or more.

To check the ABS indicator light bulb, the light is activated when the ignition switch is turned on. It is turned off after the engine is started if there is no abnormality in the system.

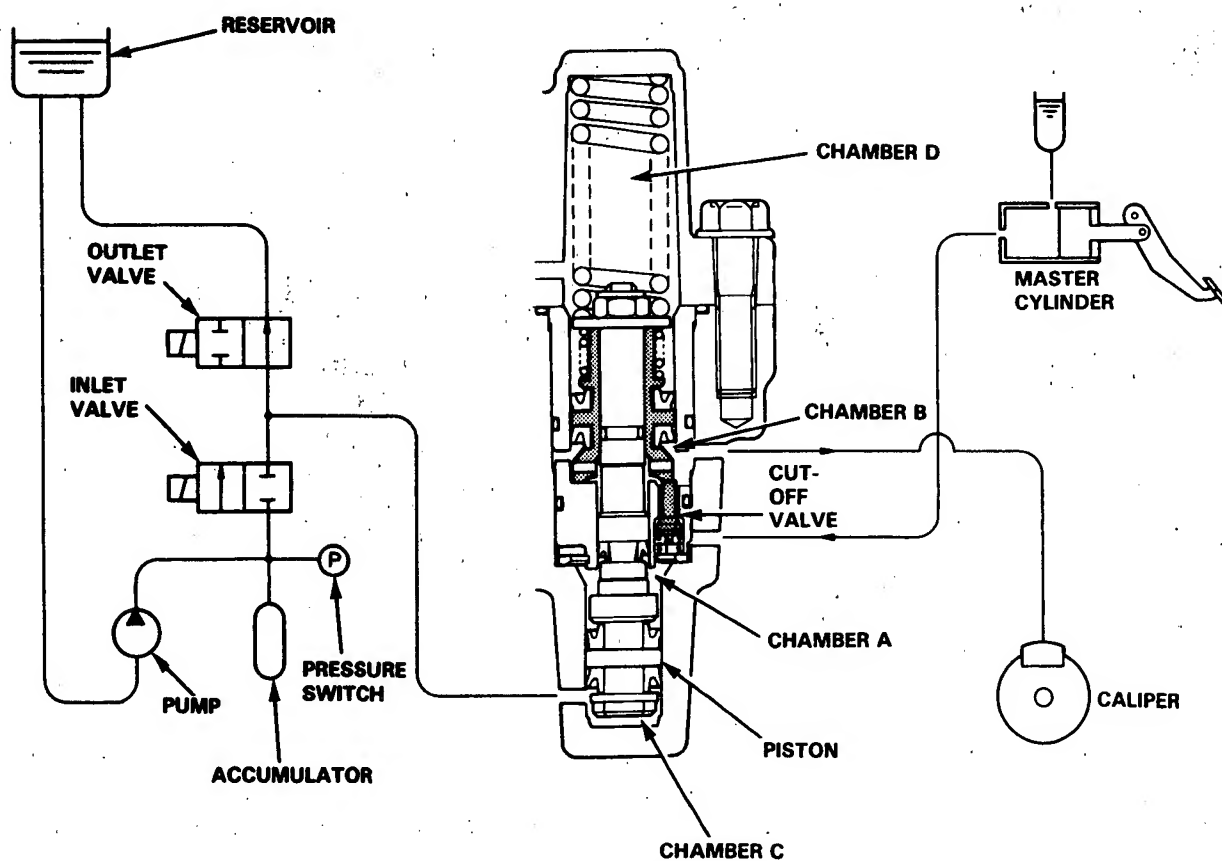
## Operation

### 1. Ordinary Braking Function

In ordinary brake operations, the cut-off out valve in the modulator is open to transmit the hydraulic pressure from the master cylinder to the brake calipers via chamber A and chamber B.

Chamber C is connected to the reservoir through the outlet valve which is normally open. It is also connected to the hydraulic pressure source (pump, accumulator, pressure switch, etc.) via the inlet valve which is normally closed.

Chamber D serves as an air chamber. Under these conditions, the pressures of chambers C and D are maintained at about atmospheric pressure, permitting regular braking operations.



(cont'd)

# Description

## Features/Construction/Operation (cont'd)

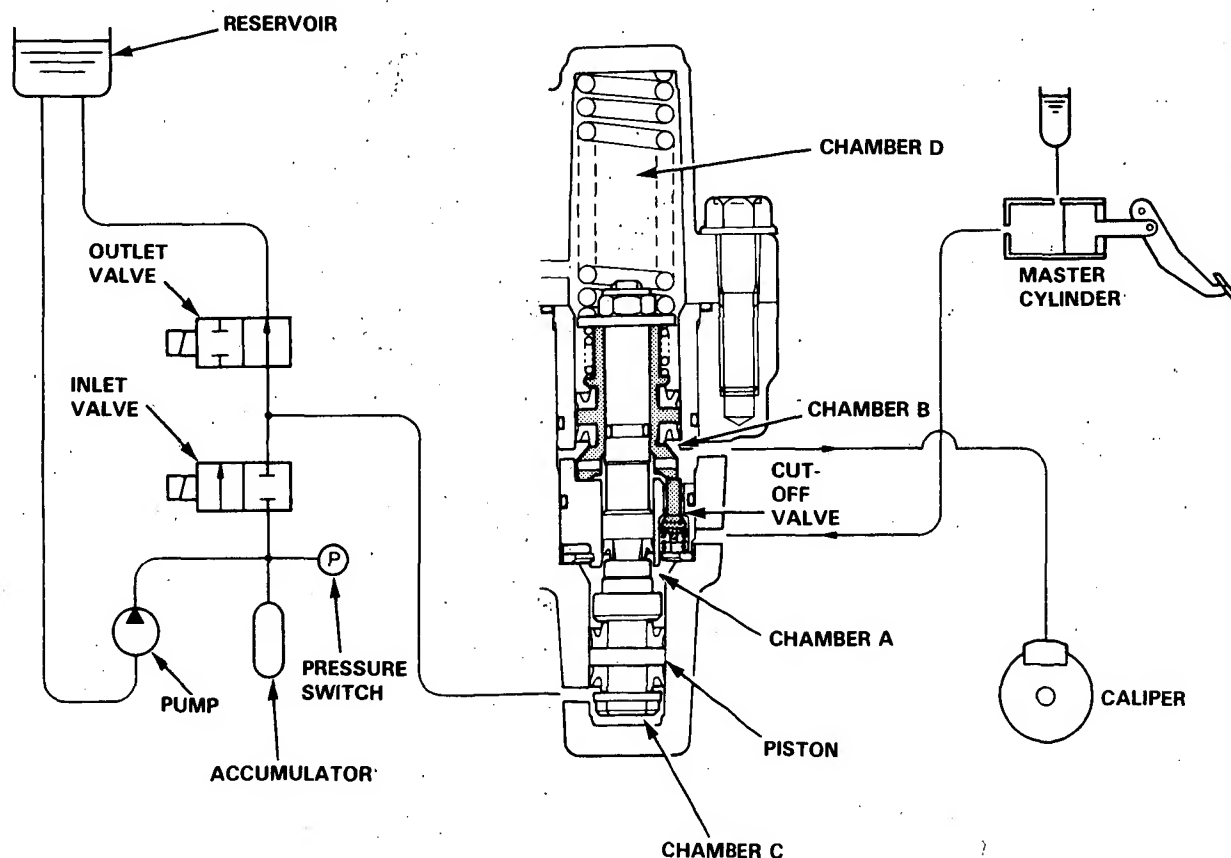
If brake inputs (force exerted on brake pedal) are excessively large and a possibility of wheel locking occurs, the control unit operates the solenoid valve, closing the outlet valve and opening the inlet valve. As a result, the high pressure is directed into chamber C, the piston is pushed upward, causing the slide piston to move upward and the cut-off valve to close.

As the cut-off valve closes, the flow from the master cylinder to the caliper is interrupted, the volume of chamber B, which is connected to the caliper, increases, and the fluid pressure in the caliper declines.

When both of the two valves, inlet and outlet, are closed (when only the outlet valve is activated) the pressure in the caliper is maintained constant.

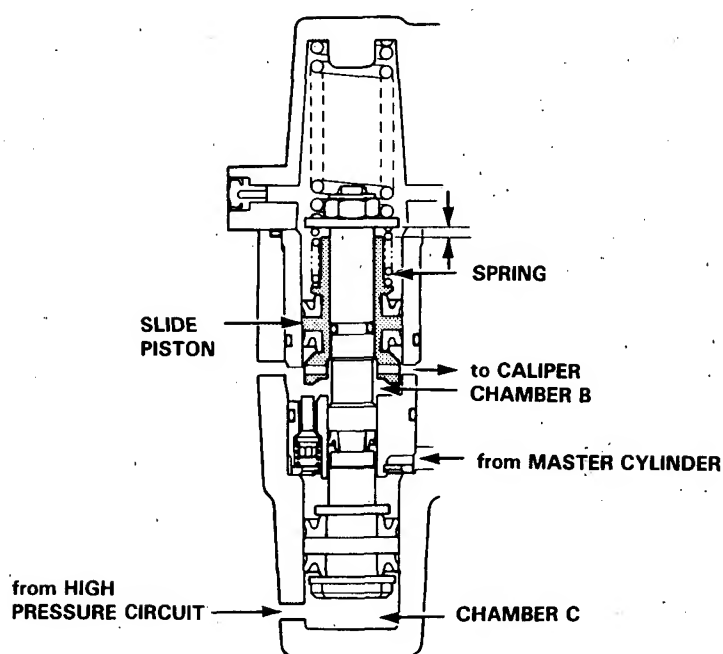
When the possibility of wheel locking ceases, it is necessary to restore the pressure in the caliper. The solenoid valve is therefore turned off (outlet valve: open, inlet valve closed).

Process	Caliper Pressure	Outlet Valve		Inlet Valve	
		Electric Power	Hydraulic Circuit	Electric Power	Hydraulic Circuit
Caliper pressure declining		ON	Close	ON	Open
Caliper pressure constant		ON	Close	OFF	Close
Caliper pressure increasing		OFF	Open	OFF	Close



## 2. Slide Piston Function

When the car is used on rough roads where the tires sometimes lose adhesion, the anti-lock brake system may function excessively, causing an excessively large volume of brake fluid to flow into the chamber C. As this occurs, the piston is moved excessively, resulting in an abnormal loss of pressure in chamber B. In order to overcome this problem, the slide piston is kept in a proper position by spring force to prevent the pressure in chamber B to becoming negative.



(cont'd)

# Description

## Features/Construction/Operation (cont'd)

### 3. Kickback

When the anti-lock brake system is functioning, the piston moves upward, the volume of chamber B increases, and the fluid pressure on the caliper side is reduced. At the same time, the volume of chamber A is reduced and the brake fluid is returned to the master cylinder. When the brake fluid is pushed back to the master cylinder, the driver can feel the functioning of the anti-lock brake system because the brake pedal is kicked back.

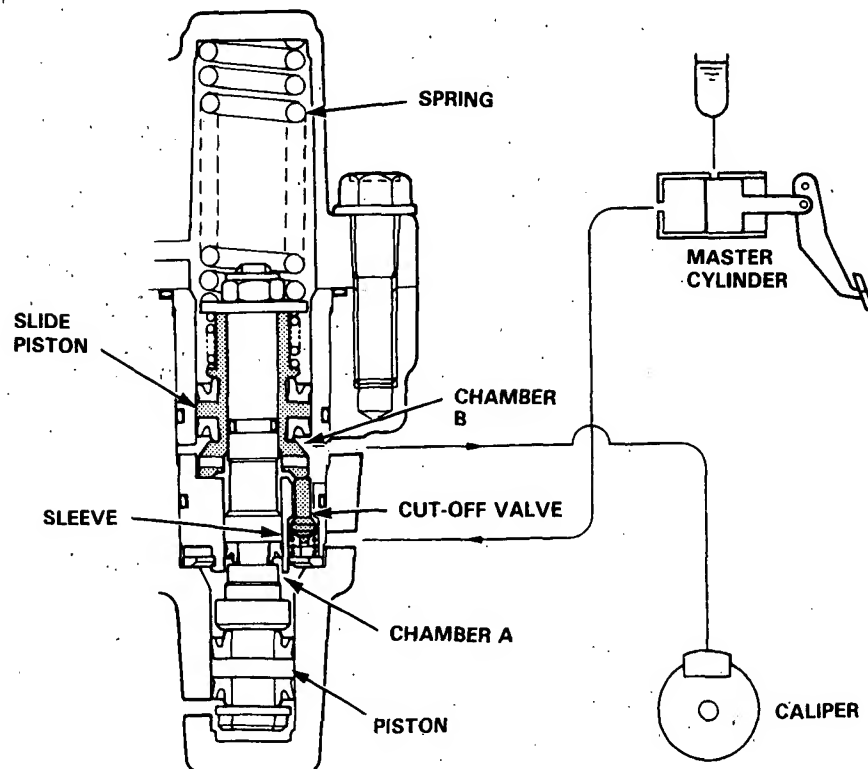
### 4. PCV (Proportioning Control Valve) Function

In the modulator for the rear wheels, the diameters of the piston and the slide piston are distinctly different. This provides a PCV (Proportioning Control Valve) function to prevent the rear wheels from locking during an emergency stop.

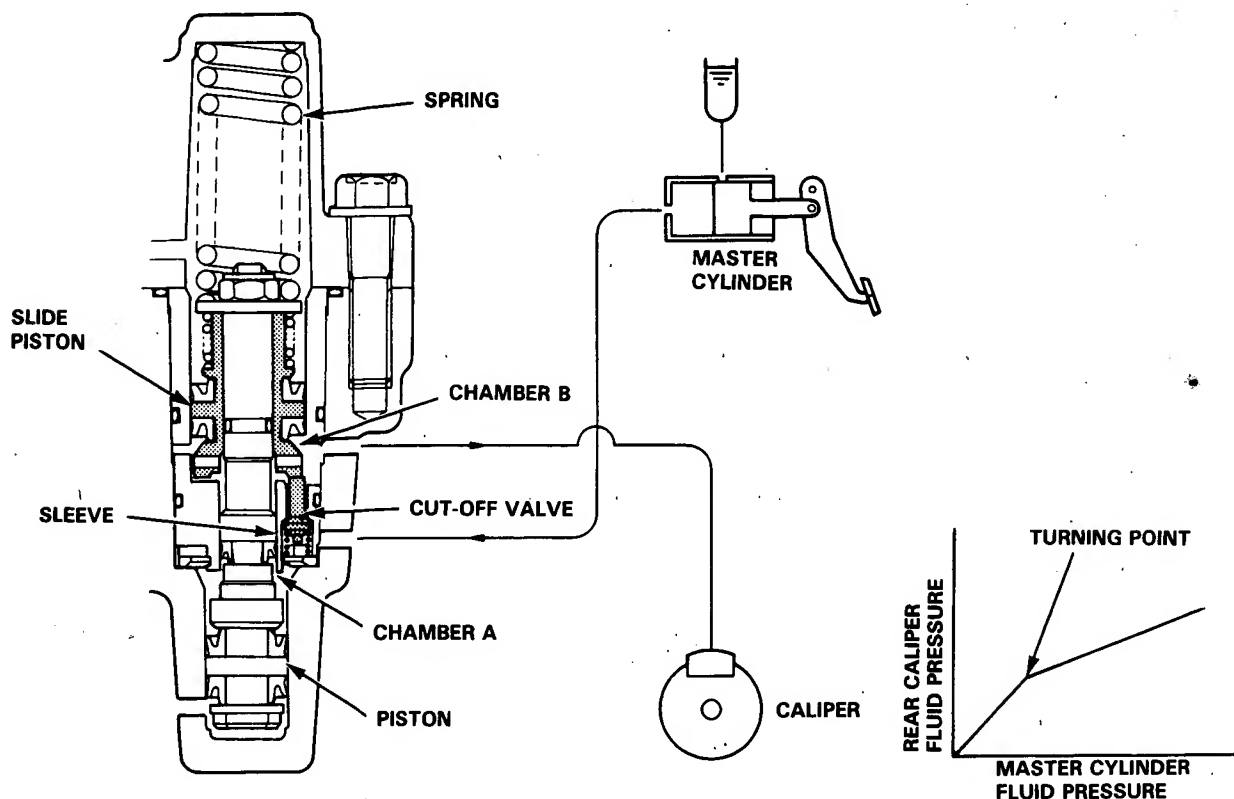
#### (1) Before the Turning Point

1) When the fluid pressure from the master cylinder is below the turning point, the cut-off valve is always pushed downward by the force of the slide piston and its spring.

Under these conditions, there is a gap between the cut-off valve shoulder and the sleeve. Chamber A and chamber B are therefore connected through the gap. The pressure from the master cylinder flows into the rear calipers through chamber A and chamber B.



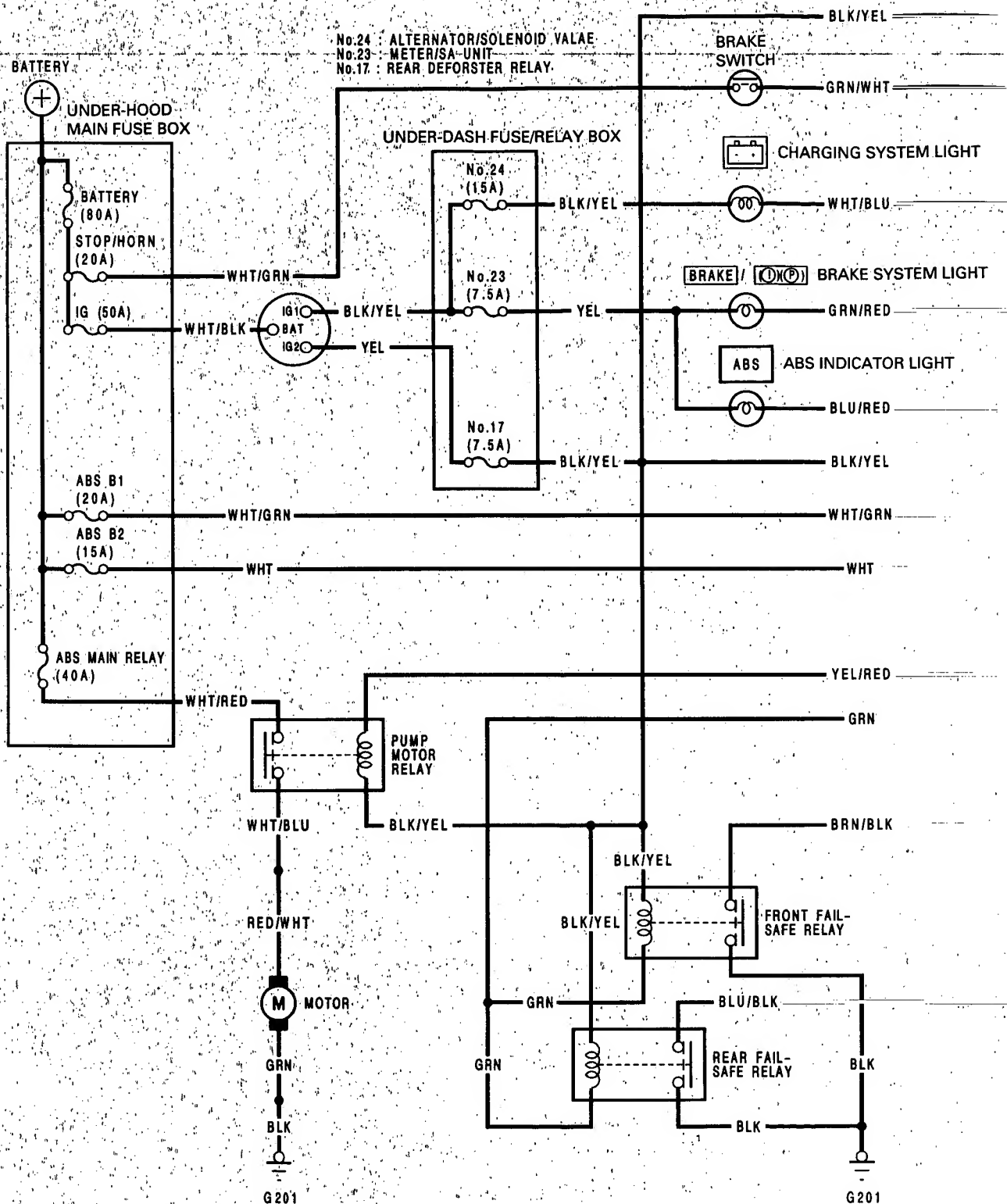
- 2) When the fluid pressure from the master cylinder reaches the turning point, the force on the slide piston overcomes the force of spring, causing the slide piston to travel upward. The cut-off valve, previously being in contact with the bottom of the slide piston, then moves upward and the cut-off valve shoulder hits the sleeve, blocking the fluid passages (the fluid pressure at this point is called the turning point).



(2) After the turning point

As the fluid pressure from the master cylinder further increases, the pressure in chamber A becomes higher, causing a force to push down the large diameter portion of the piston. Consequently, the slide piston comes down, the cut-off valve is pushed downward by the bottom of the slide piston, allowing chambers A and B to connect momentarily. As this occurs, pressure in chamber B increases, the slide piston is pushed upward, the cut-off valve goes up, and the connection between chamber A and chamber B is blocked again. As described above, when the pressure in the master cylinder is above the turning point, the slide piston reduces the pressure in the rear caliper to the prescribed pressure by repeating these processes.

# Circuit Diagram

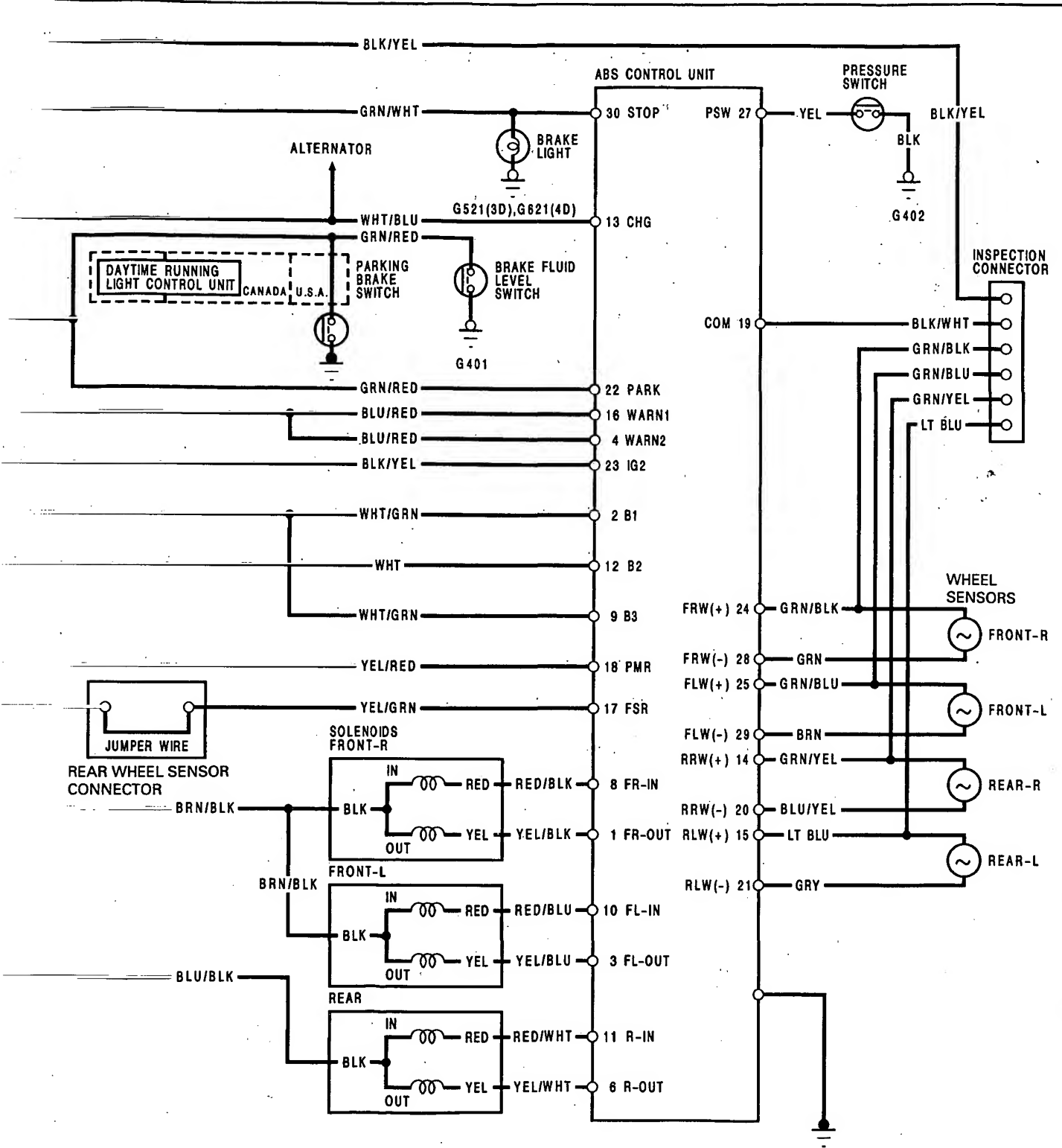


18P CONNECTOR													12P CONNECTOR											
30	29	28	27										25	24	23	12	11					10	9	8
22	21	20		19	18	17	16		15	14	13					6			4			3	2	1

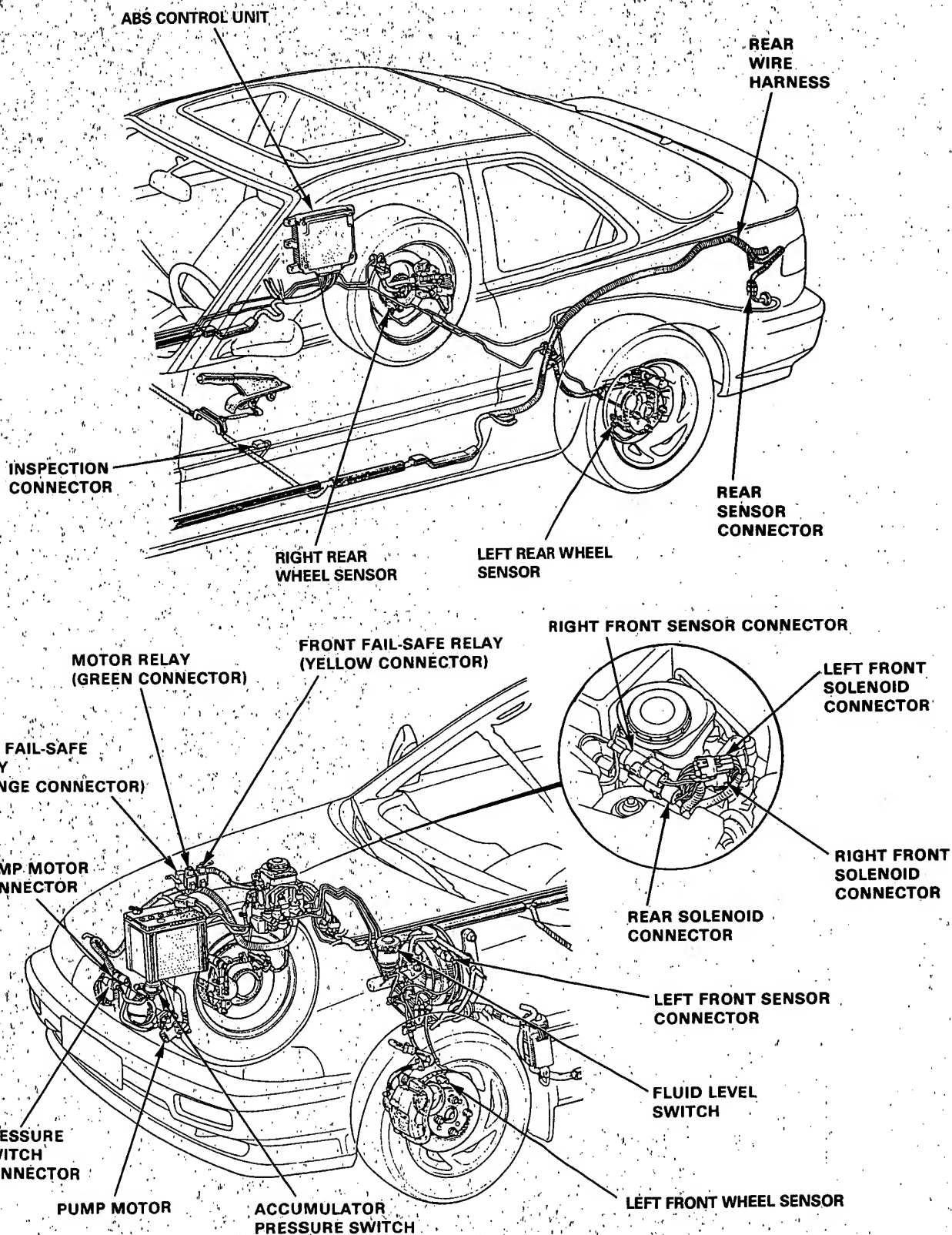
ABS CONTROL UNIT CONNECTOR

View from terminal side





# Wiring/Connector Locations



# ALB Checker



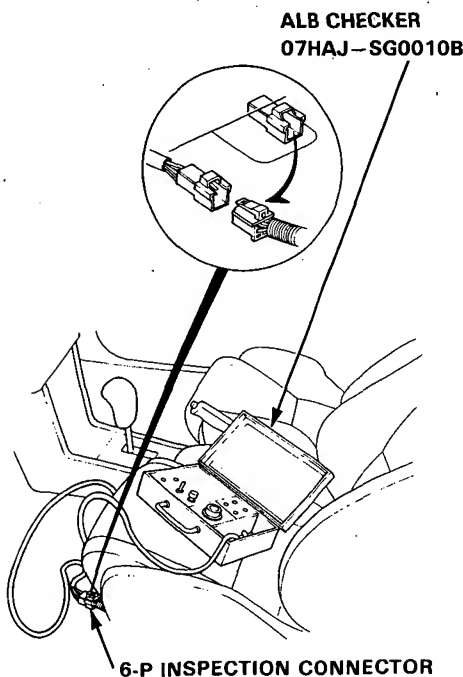
## Function Test

### NOTE:

- The ALB checker is designed to confirm proper operation of the anti-lock brake system (ABS) by simulating each system function and operating condition. Before using the checker, confirm that the anti-lock brake system (ABS) indicator light is not indicating some other problem with the system. The light should go on when the ignition is first turned on and then go off and stay off two seconds after the engine is started.
- The checker should be used through modes, 0–5, to confirm proper operation of the system, in any one of the following situations:
  - After replacing any ABS component.
  - After replacing or bleeding the system fluid (0 mode not necessary).
  - After any body or suspension repair that may have affected the sensors or their wiring.
- The procedure for modes 1-5 are on this page and 19-48, mode 0 (wheel sensor signal) is on page 19-49.

**⚠ WARNING** Disconnect the ALB checker before driving the car. A collision can result from a reduction, or complete loss, of braking ability causing severe personal injury or death.

1. With the ignition switch off, disconnect the 6-P inspection connector from the connector cover on the cross-member under the driver seat and connect the 6-P inspection connector to the ALB checker.

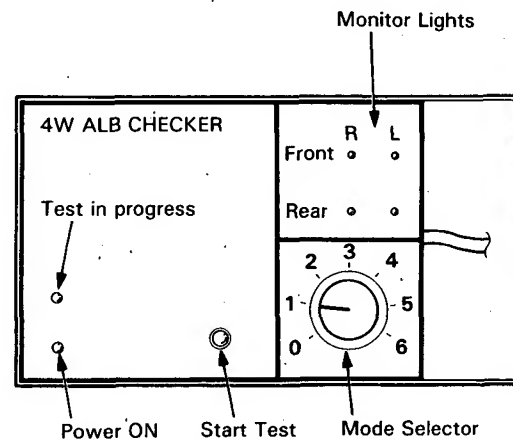


See page 19-30 for other applicable checkers.

NOTE: Place the vehicle on level ground with the wheels blocked, put the transmission in neutral for manual transmission models, and in **P** position for automatic transmission models.

2. Start the engine and release the parking brake,
3. Operate the ALB checker as follows,
  - (1) Turn the Mode Selector switch to "1."
  - (2) Push the Start Test switch:
    - The test in progress light should come ON.
    - In one or two more seconds, all four monitor lights should come on (If not the checker is faulty).
    - The ABS indicator light should not come ON (If it comes on the checker harness to the 6-P connector connection is faulty).

NOTE: When Test in progress indicator light is ON, don't turn the Mode Selector switch.



(cont'd)

# ALB Checker

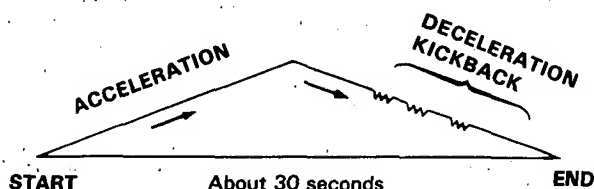
## Function Test (cont'd)

4. Turn the Mode Selector switch further to "2."

5. Depress the brake pedal firmly and push the Start Test switch.

The ABS indicator light should not go on while the Test in Progress light is ON. There should be kickback on the brake pedal. If not as described, go to troubleshooting, page 19-50.

NOTE: The operation sequence simulated by Modes 2, 3, 4 and 5:



6. Turn the Mode Selector switch to 3, 4 and 5. Perform step 5 for each of the test mode positions.

### Mode 1:

Sends the simulated driving signal 0 mph (0 km/h) → 113 mph (180 km/h) → 0 mph (0 km/h) of each wheel to the ABS control unit. There should be NO kickback.

### Mode 2:

Sends the driving signal of each wheel, then sends the lock signal of the rear left wheel to the ABS control unit. There should be kickback.

### Mode 3:

Sends the driving signal of each wheel, then sends the lock signal of the rear right wheel to the ABS control unit. There should be kickback.

### Mode 4:

Sends the driving signal of each wheel, then sends the lock signal of the front left wheel to the ABS control unit. There should be kickback.

### Mode 5:

Sends the driving signal of each wheel, then sends the lock signal of the front right wheel to the ABS control unit. There should be kickback.

### Mode 6:

Not used on this model.

NOTE: If little or no kickback is felt from the brake pedal in modes 2 — 5, bleed air from the ABS (see page 19-77).

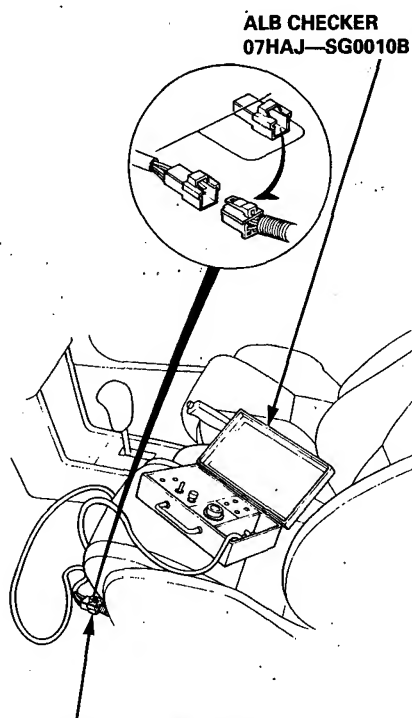
### Inspection points:

1. The ABS indicator light goes ON in mode 1.
  - Check the wiring. If it is OK, the ABS control unit is faulty.
  - If the ABS indicator light goes on 120 seconds later, but the power unit stops, refer to page 19-53.
2. There is no kickback in modes 2 through 5.
  - Faulty pressure switch (remains ON)
  - Shorted wires
  - Faulty or disconnected power unit connector
  - Faulty power unit relay
3. Weak kickback in modes 2 through 5.
  - Bleed high pressure circuits.
4. Power unit stops in mode 1, but it does not stop and there is no kickback in modes 2 through 5.
  - Brake fluid leakage
  - Bleed power unit
  - Clogged power unit outlet
  - Clogged or deteriorated power unit hose

## Wheel Sensor Signal Confirmation

**NOTE:** Use the ALB checker (mode 0) to confirm proper wheel sensor operation.

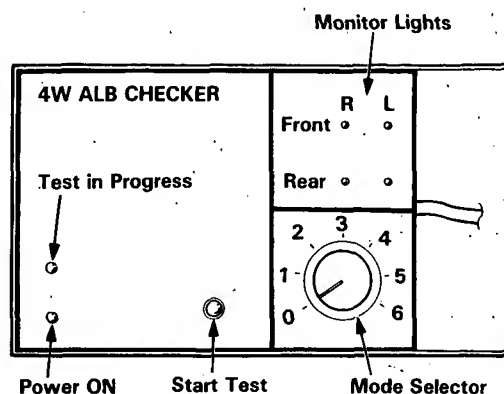
1. Disconnect the 6-P inspection connector from the connector cover on the cross member under the driver seat and connect the 6-P inspection connector to the ALB checker.



**6-P INSPECTION CONNECTOR**

See page 19-30 for other applicable checkers.

2. Raise the car so that all four wheels are off the ground and support on safety stands.
3. Turn the ignition switch ON.
4. Turn the Mode Selector switch to "0."



5. With the transmission in neutral, rotate each wheel briskly (one revolution per second) by hand, and confirm that its respective monitor light on the checker blinks as the wheel rotates.

**NOTE:**

- Rotating a wheel too slowly will produce only a weak blink of its monitor light that may be difficult to see.
  - In bright sunlight, the monitor light may be difficult to see. Perform tests in a shaded area.
  - In some instances, it may not be possible to spin the front wheels fast enough to get a monitor indication. If necessary, start the engine and slowly accelerate and decelerate the front wheels.
- The monitor lights should blink indicating a good wheel sensor signal.

If any monitor light fails to blink, check the suspected sensor, its air gap and its wiring/connectors.

# Troubleshooting

## Anti-lock Brake System (ABS) Indicator Light

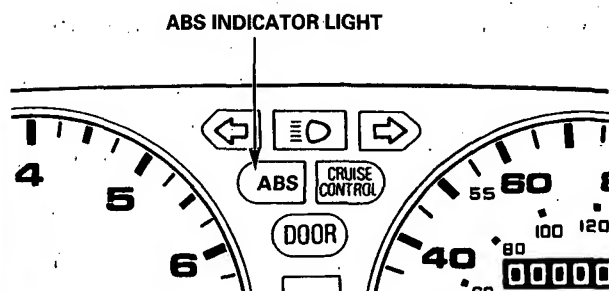
### Temporary Driving Conditions:

1. The ABS indicator light will come on and the ABS control unit memorizes the diagnostic trouble code (DTC) under certain conditions.

NOTE: The DTCs are explained on pages 19-52.

- The tire(s) adhesion is lost due to excessive cornering speed.  
DTC: 5, 5-4, 5-8
- The vehicle loses traction when starting from a stuck condition on a muddy, snowy, or sandy road.  
DTC: 4-1, 4-2, 4-4, 4-8
- When the parking brake is applied for more than 30 seconds while the vehicle is being driven.  
DTC: 2
- The vehicle is driven on extremely rough road.

The ABS is OK, if the ABS indicator light goes off after the engine is restarted.



2. If you receive a customer's report that the ABS indicator light sometimes comes on, check the system using the ALB checker to confirm whether there is any trouble in the system.  
See page 19-47.
3. The ABS indicator light will come on and the LED (see page 19-51) will display a code when there is insufficient battery voltage to the ABS control unit. An example would be when the battery is so weak that the car must be jump-started. After the battery is sufficiently recharged, the ABS indicator light will work normally after the engine is stopped and restarted.

However, after recharging the battery, the code must be cleared from the ABS control unit's memory by disconnecting the ABS B2 (15A) fuse for at least three seconds.

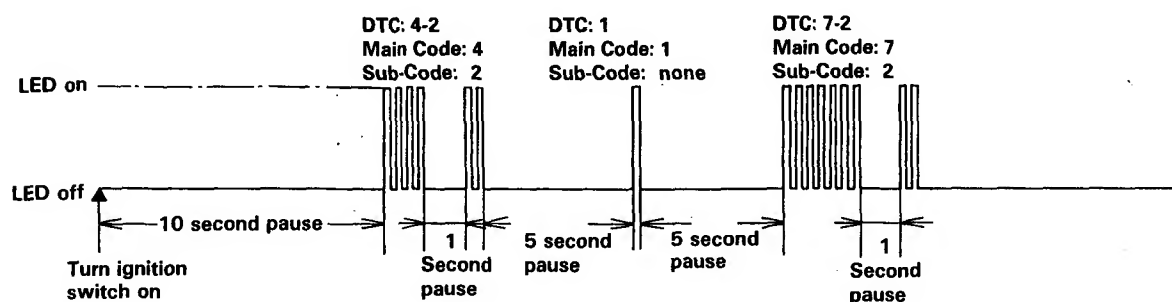
### ABS Indicator Light Circuit:

1. The ABS indicator light, does not go on when the ignition switch is turned on. Check the following items. If they are OK, check the ABS control unit connectors. If not loose or disconnected, install a new ABS control unit and recheck:
  - Blown ABS indicator light bulb.
  - Open circuit in YEL wire between No. 23 (7.5 A) fuse and gauge assembly.
  - Open circuit in BLU/RED wire between gauge assembly and ABS control unit.
  - Loose component grounding of the ABS control unit to the body.
2. The ABS indicator light remains ON after the engine is started, however the LED on the ABS control unit does not blink any code or sub-code. Check for the following:
  - Loose or poor connection of the wire harness at the ABS control unit.
  - Faulty ABS B2 (15 A) fuse.
  - Open circuit in WHT wire between ABS B2 (15 A) fuse and ABS control unit.
  - Open circuit in BLK/YEL wire between No. 17 (7.5 A) fuse and ABS control unit.
  - Short circuit in BLU/RED wire between gauge assembly and ABS control unit.
  - Open circuit in WHT/BLU wire between alternator and ABS control unit.

If the problem is not found, substitute a known-good ABS control unit and recheck whether the ABS indicator light remains ON.

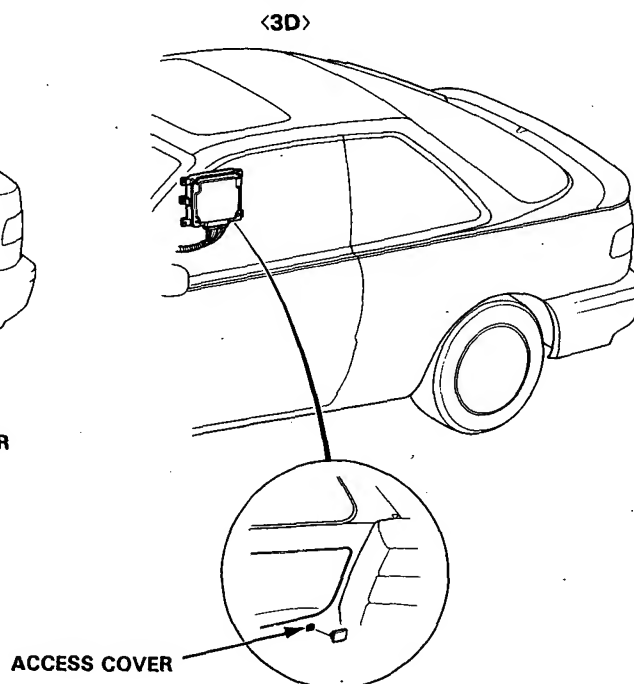
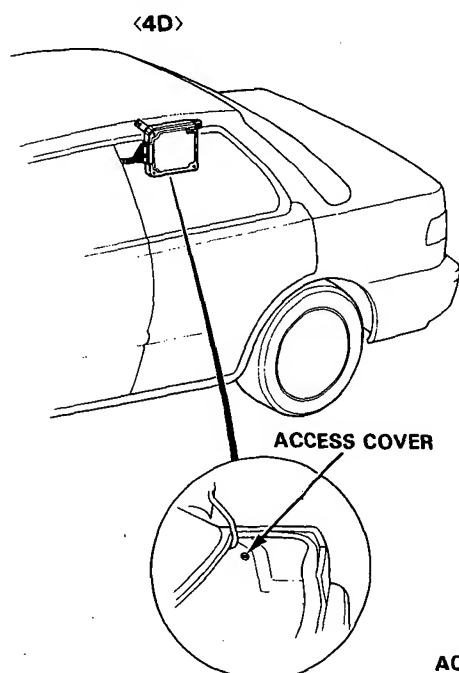
## Diagnostic Trouble Code (DTC)

1. Remove the ABS control unit access cover.
2. Turn the ignition switch on, but do not start the engine.
3. Record the blinking frequency of the LED on the ABS control unit. The blinking frequency indicates the Diagnostic Trouble Code (DTC).



### NOTE:

- The ABS control unit can indicate up to the three DTCs.
- If the LED does not light, see Troubleshooting of ABS Indicator Light Circuit page 19-50.
- If you miscount the blinking frequency, turn the ignition switch off, then turn on to blink the LED again.
- After the repair is completed, disconnect the ABS B2 (15 A) fuse for at least three seconds to erase the ABS control unit's memory. Then turn the ignition key on again and recheck.
- The memory is erased if the connector is disconnected from the ABS control unit or the ABS control unit is removed from the body.
- After recording the main and sub-code (if applicable), refer to the Symptom-to-System Chart.



# Troubleshooting

## Symptom-to-System Chart

DIAGNOSTIC TROUBLE CODE (DTC)		PROBLEMATIC COMPONENT/ SYSTEM	AFFECTED				PAGE	OTHER COMPONENT	PAGE
MAIN CODE	SUB-CODE		FRONT RIGHT	FRONT LEFT	REAR RIGHT	REAR LEFT			
①	—	Hydraulic Controlled Components	—	—	—	—	19-53	ABS MAIN RELAY fuse Motor relay (ON) Pressure Switch (OFF) Accumulator Modulator(IN VLV)	19-78
②	—	Parking brake switch-related problem	—	—	—	—	19-56	Brake fluid level switch Brake system light	
③	①	Pulser(s)	○				19-79	Wheel sensor installation	
	②			○					
	④				○	○			
④	①	Wheel sensor	○				19-57		
	②			○					
	④				○				
	⑧					○			
⑤	—	Wheel sensor(s) Rear wheel lock			○	○	19-58	Modulator Rear brake drag	
	④				○				
	⑧					○			
⑥	—	Fail-safe relay	○		○		19-61		19-78 (Function Test)
	①		○						
	④				○				
⑦	①	Solenoid related problem	○				19-63	ABS B1 fuse Front fail-safe relay	19-78
	②			○					
	④				○	○		Rear fail-safe relay	



## Flowcharts

### Diagnostic Trouble Code (DTC) 1: Hydraulic Controlled Components.

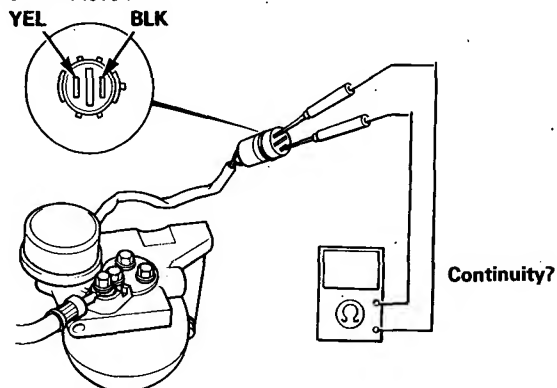
**CAUTION:** Use only the digital multimeter to check the system.

**NOTE:** The LED does not blink when the following failures occur.

- The contact points of the motor relay remain closed (the motor runs continuously even after the ignition key is removed).
- YEL/RED wire is shorted or the control unit is internally shorted (the motor stops when the ignition switch is turned off).

#### Pre-test steps:

- Check ABS MAIN RELAY (40A) Fuse.
- Check all ABS hoses and pipes (low and high pressure) for signs of leaking, bending or kinking.
- Check reservoir fluid level of the modulator, and if necessary, fill to the MAX level.



Disconnect the pressure switch connector and check the continuity between BLK and YEL terminals.

Is there continuity?

YES

Bleed high pressure fluid from the maintenance bleeder with the Bleeder T-wrench. (see page 19-68).

Check the continuity of pressure switch between BLK and YEL terminals.

Is there continuity?

YES

Replace the pressure switch (closed).

NO

Reconnect the pressure switch connector.

Bleed high pressure fluid from the maintenance bleeder with the Bleeder T-wrench (see page 19-68). Jack up the front of car and support with safety stands, then run the engine in gear above 6 mph (10 km/h).

**⚠ WARNING** Block rear wheels before jacking up front of car.

(To page 19-54).

(cont'd)

# Troubleshooting

## Flowcharts (cont'd)

(From page 19-53)

Does the pump motor run? YES (To page 19-55)

NO

Disconnect the 18P connector from the ABS control unit.

Check for continuity between the YEL terminal and body ground.

Is there continuity?

YES

Repair short in YEL wire between the ABS control unit and pressure switch.

NO

Connect the YEL/RED terminal to body ground using a jumper wire. Turn the ignition switch ON.

Does the pump motor run?

YES

Substitute a known-good ABS control unit and recheck. If the system voltage is now OK, replace the original ABS control unit.

NO

Remove the pump motor relay and check the pump motor relay (see page 19-78).

Does it work properly?

NO

Replace the pump motor relay.

YES

Connect the WHT/RED and WHT/BLU terminals using a jumper wire.

Does the pump motor run?

NO

(To page 19-56)

YES

Check voltage between the BLK/YEL terminal (+) and body ground (-).

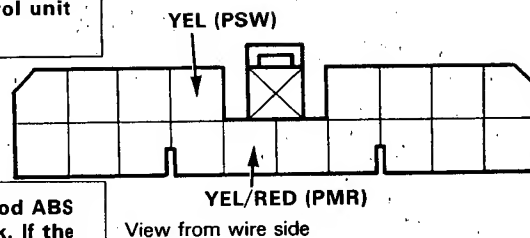
Is there battery voltage?

NO

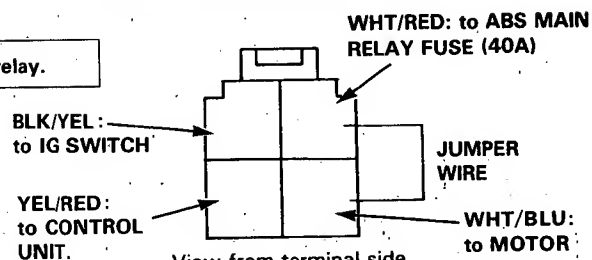
Repair open in BLK/YEL wire between the No. 17 fuse and pump motor relay.

YES

Repair open in YEL/RED wire between the ABS control unit and pump motor relay.

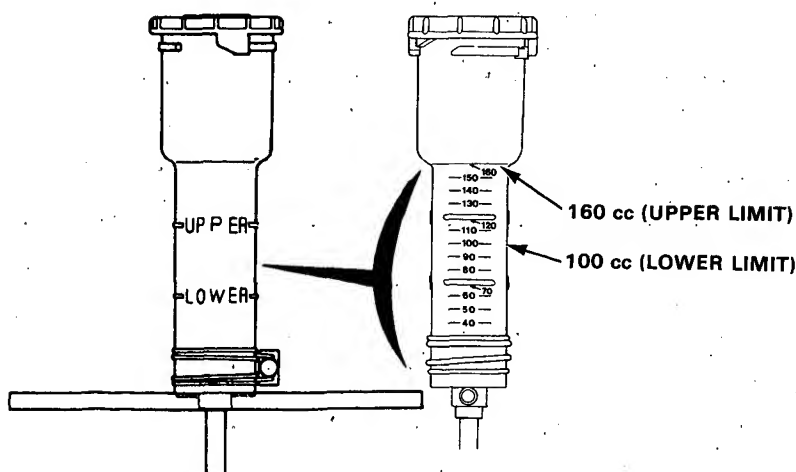
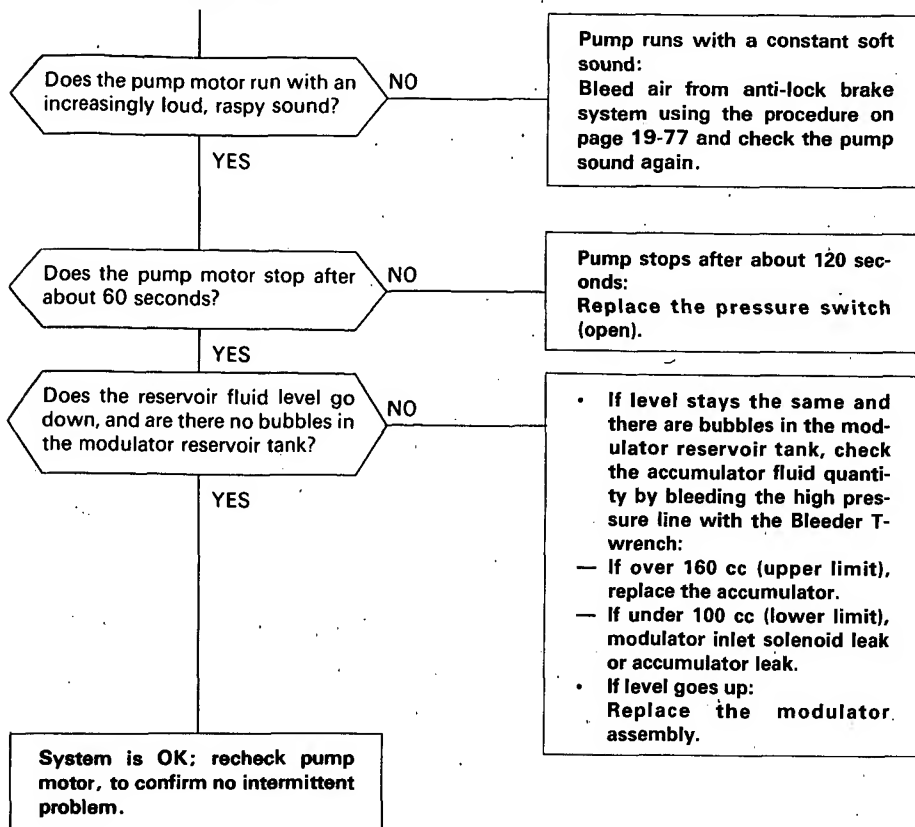


PUMP MOTOR RELAY CONNECTOR



CAUTION: If the motor runs disconnect the jumper wire immediately.

(From page 19-54)



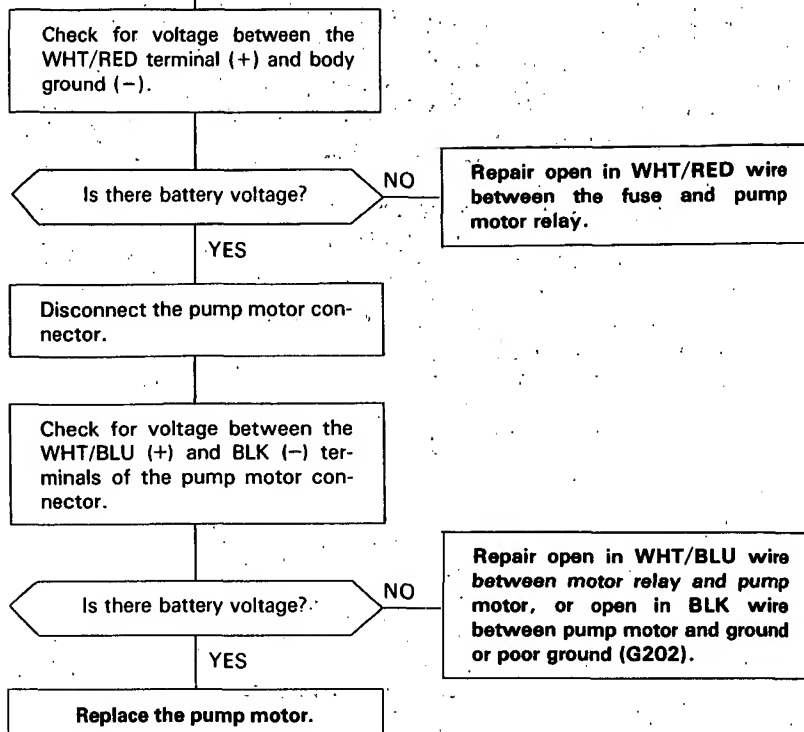
NOTE: The fluid enters the reservoir under pressure; wait 1 or 2 minutes for air bubbles to disappear and level to stabilize.

(cont'd)

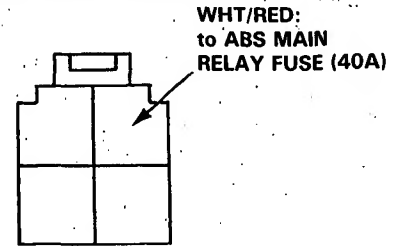
# Troubleshooting

## Flowcharts (cont'd)

(From page 19-54)

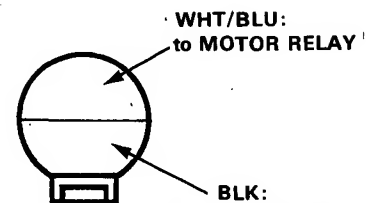


PUMP MOTOR RELAY CONNECTOR



View from terminal side.

PUMP MOTOR CONNECTOR



View from terminal side.

### Diagnostic Trouble Code (DTC) 2: Parking Brake Switch Related Problem

If the parking brake has been released, the following items are possible causes. If they are OK, check the ABS control unit connectors for good connection. If not loose or disconnected, substitute a known-good ABS control unit and recheck.

NOTE: Before troubleshooting DTC 2, remove the ABS B2 (15 A) fuse for three seconds to clear the ABS control unit's memory, then test drive the car.

If the ABS indicator light and LED stay off, the probability is that the car was driven with the parking brake applied.

- The parking brake is applied for more than 30 seconds while driving.
- The brake fluid level in the master cylinder is too low.
- GRN/RED wire is shorted between the brake system light and parking brake switch.
- GRN/RED wire is shorted between the brake system light and brake fluid level switch.
- The brake system light is blown.
- GRN/RED has an open between the brake system light and ABS control unit.

# Diagnostic Trouble Code (DTC) 4-1 to 4-8:

## Wheel Sensor

**CAUTION:** Use only the digital multimeter to check the system.

Disconnect wire harness from wheel sensor.

Check for resistance between the sensor terminals.

Is there Front: 500–1,000  $\Omega$ , Rear: 700–1,200  $\Omega$ ?

NO

Replace the wheel sensor.

YES

Disconnect the 18P connector from the ABS control unit.

Check each wire for continuity between the sensor and ABS control unit:

GRN/BLK: Front Right Positive  
GRN/BLU: Front Left Positive  
GRN/YEL: Rear Right Positive  
LT BLU: Rear Left Positive  
GRN: Front Right Negative  
BRN: Front Left Negative  
BLU/YEL: Rear Right Negative  
GRY: Rear Left Negative

Is there continuity?

NO

Repair open in sensor wire:

GRN/BLK: Front Right Positive GRN: Front Right Negative  
GRN/BLU: Front Left Positive BRN: Front Left Negative  
GRN/YEL: Rear Right Positive BLU/YEL: Rear Right Negative  
LT BLU: Rear Left Positive GRY: Rear Left Negative

YES

Check for continuity to body ground.

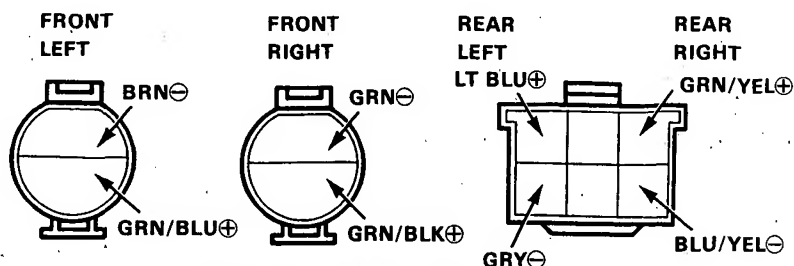
Is there continuity?

YES

Repair short in sensor wire.

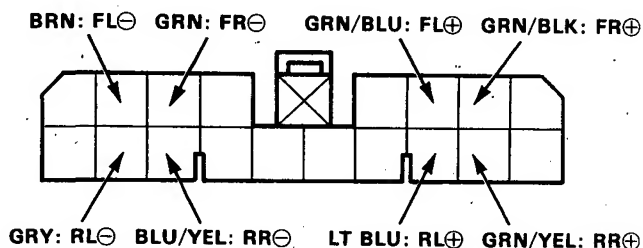
NO

Check for loose ABS control unit connectors. If necessary, substitute a known-good ABS control unit and recheck.



SENSOR SIDE CONNECTORS

View from terminal side.



View from wire side.

(cont'd)

# Troubleshooting

## Flowcharts (cont'd)

**Diagnostic Trouble Code (DTC) 5 to 5-8:**

**Wheel Sensor(s)**

**CAUTION:** Use only the digital multimeter to check the system.

Disconnect the connector from the wheel sensor.

Check for resistance between the sensor terminals.

Is there 700–1,200  $\Omega$ ? NO

Replace the wheel sensor.

YES

Disconnect the 18P connector from the ABS control unit.

Check each wire for continuity between the sensor and ABS control unit:  
GRN/YEL: Rear Right Positive  
LT BLU: Rear Left Positive  
BLU/YEL: Rear Right Negative  
GRY: Rear Left Negative

Is there continuity? NO

Repair open in sensor

wire:

GRN/YEL: Rear Right Positive    BLU/YEL: Rear Right Negative  
LT BLU: Rear Left Positive    GRY: Rear Left Negative

YES

Check for continuity to ground.

Is there continuity? YES

Repair short in sensor wire.

NO

Reconnect the 18P connector to the ABS control unit and the connector to the wheel sensor.

Connect the ALB checker to inspection connector.

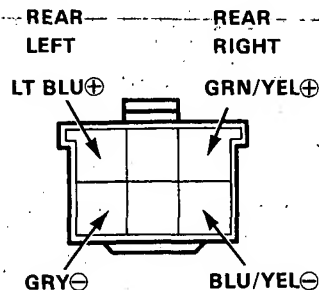
Check ABS function in MODE 2 and 3.

Does it work properly? NO

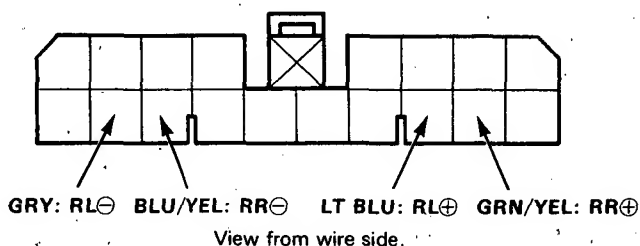
Replace the modulator.

YES

Check for brake drag, if OK, substitute a known-good ABS control unit and recheck.



**SENSOR SIDE CONNECTOR**  
View from terminal side.



View from wire side.

# **Diagnostic Trouble Code (DTC) 6-1: Front Fail-Safe Relay Circuit** **CAUTION: Use only the digital multimeter to check the system.**

Remove the front fail-safe relay.

Check relay function (see page 19-78).

Does it work properly?

NO

Replace the front fail-safe relay.

YES

Disconnect the 3P connectors from the front solenoids.

Check for continuity in BRN/BLK wire between the front fail-safe relay and body ground.

Is there continuity?

YES

Repair short in BRN/BLK wire between the solenoids and fail-safe relay.

NO

Check for continuity between the solenoid connector BLK terminals and ground.

Is there continuity?

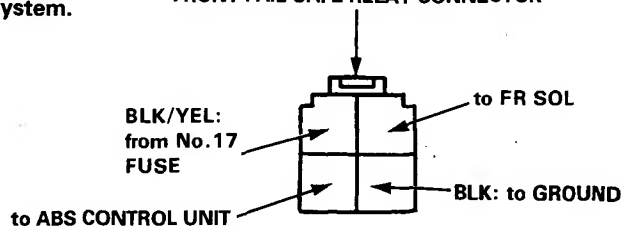
YES

Replace the solenoid (short).

NO

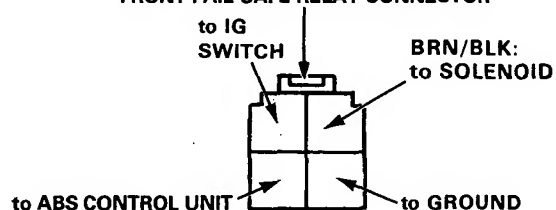
(To page 19-60)

**FRONT FAIL-SAFE RELAY CONNECTOR**



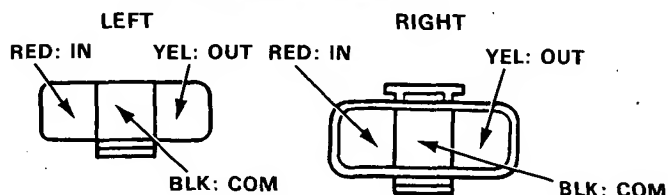
View from terminal side.

**FRONT FAIL-SAFE RELAY CONNECTOR**



View from terminal side

**FRONT SOLENOID CONNECTORS**



View from terminal side.

(cont'd)

# Troubleshooting

## Flowcharts (cont'd)

(From page 19-59)

Disconnect the 18P and 12P connector from the ABS control unit.

Check each wire for continuity to body ground:  
RED/BLK: Front Right Inlet  
YEL/BLK: Front Right Outlet  
RED/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet

Is there continuity?

YES

NO

Repair short in wire between the solenoid and ABS control unit:  
RED/BLK: Front Right Inlet  
YEL/BLK: Front Right Outlet  
RED/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet

Check YEL/GRN wire for continuity to body ground.

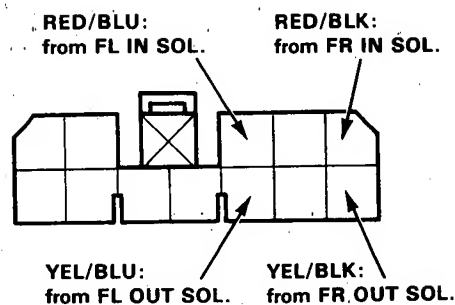
Is there continuity?

YES

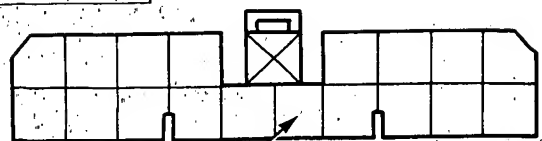
NO

Repair short in YEL/GRN wire between the front fail-safe relay and ABS control unit.

Check for loose ABS control unit connectors. If necessary, substitute a known-good ABS control unit and recheck.



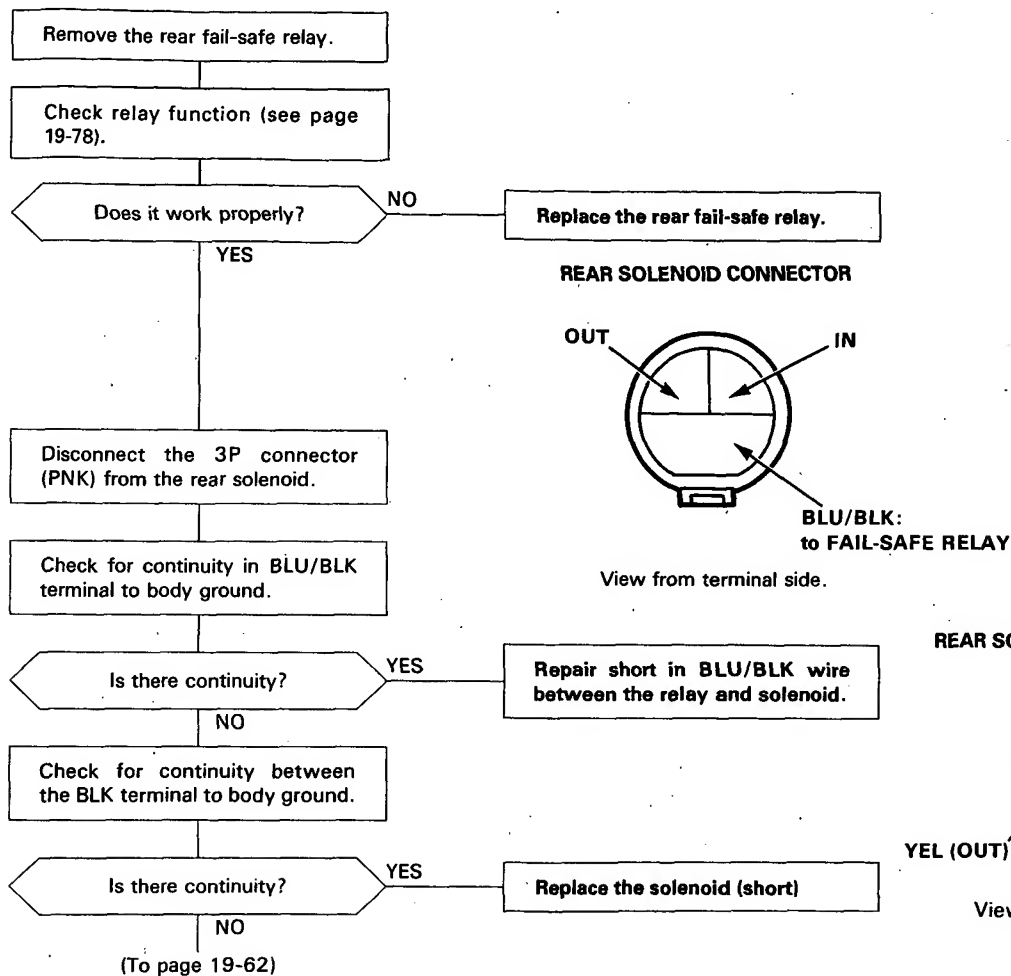
View from wire side.



View from wire side.



**Diagnostic Trouble Code (DTC) 6-4: Rear Fail-Safe Relay Circuit**  
**CAUTION: Use only the digital multimeter to check the system.**



(cont'd)

# Troubleshooting

## Flowcharts (cont'd)

(From page 19-61)

Disconnect the 18P and 12P connectors from the ABS control unit.

Check each wire for continuity to body ground:  
RED/WHT: Rear Inlet  
YEL/WHT: Rear Outlet

Is there continuity?

YES

Repair short in wire between the solenoid and ABS control unit:  
RED/WHT: Rear Inlet  
YEL/WHT: Rear Outlet

NO

Check YEL/GRN wire for continuity to body ground.

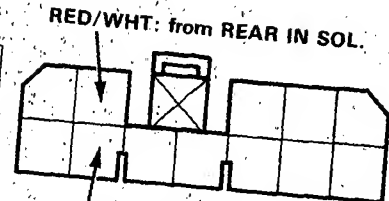
Is there continuity?

YES

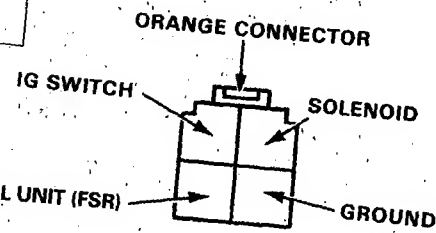
Repair short in YEL/GRN wire between the rear fail-safe relay and ABS control unit.

NO

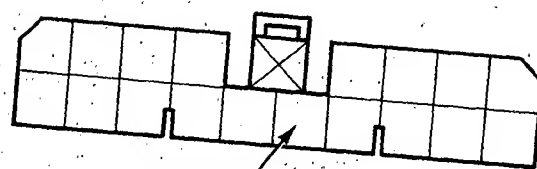
Check for loose ABS control unit connectors. If necessary, substitute a known-good ABS control unit and recheck.



View from wire side.



View from terminal side.



View from wire side.

# Diagnostic Trouble Code (DTC) 7-1 and 7-2: Front Solenoid Related Problem

**CAUTION:** Use only the digital multimeter to check the system.

Disconnect the 3P connectors from the front solenoids.

Check for resistance between the RED and BLK terminals of front solenoids.

Is there 1-3  $\Omega$ ?

NO

Replace the solenoid.

YES

Check for resistance between the YEL and BLK terminals of front solenoids.

Is there 1-3  $\Omega$ ?

NO

Replace the solenoid.

YES

Disconnect the 12P connector from the ABS control unit.

Check each wire for continuity between the ABS control unit and front solenoid:

RED/BLK: Front Right Inlet  
YEL/BLK: Front Right Outlet  
RED/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet

Is there continuity?

NO

Repair open in wire:  
RED/BLK: Front Right Inlet  
YEL/BLK: Front Right Outlet  
RED/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet

YES

Check each wire for continuity between the ABS control unit and body ground.

RED/BLK: Front Right Inlet  
YEL/BLK: Front Right Outlet  
RED/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet

Is there continuity?

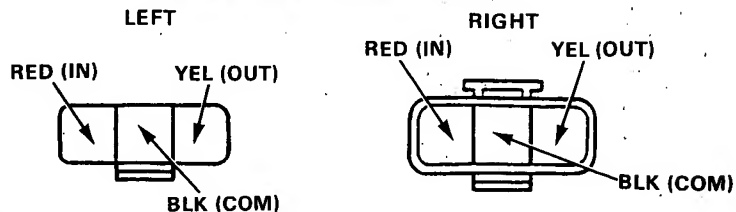
YES

Repair short in wire:  
RED/BLK: Front Right Inlet  
YEL/BLK: Front Right Outlet  
RED/BLU: Front Left Inlet  
YEL/BLU: Front Left Outlet

NO

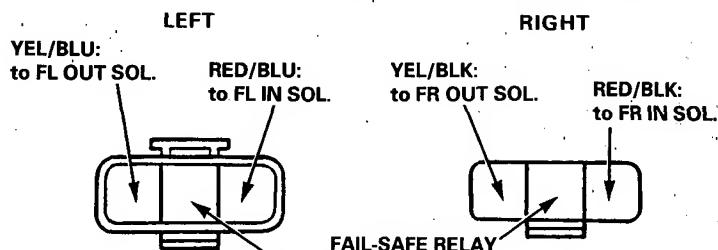
(To page 19-64)

## FRONT SOLENOID CONNECTORS



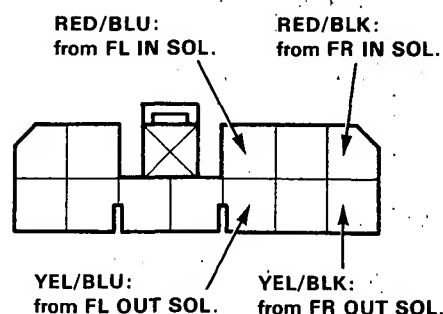
View from terminal side.

## HARNESS SIDE CONNECTORS



FAIL-SAFE RELAY

View from terminal side.

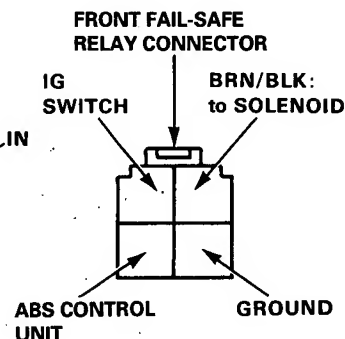
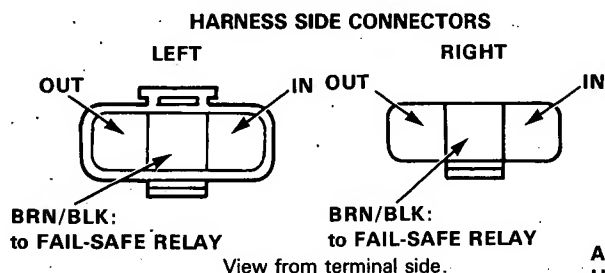
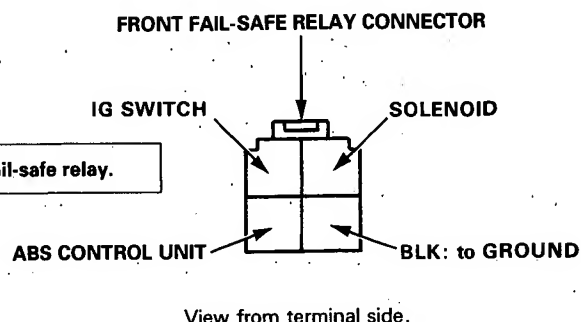
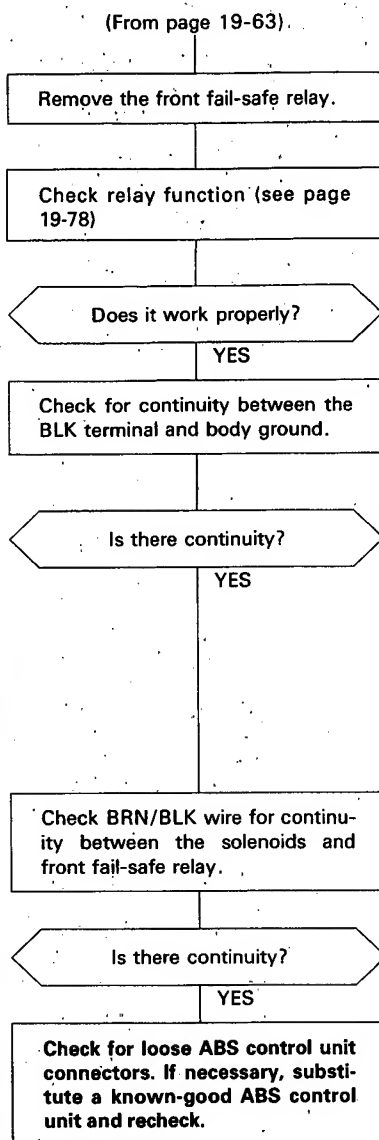


View from wire side.

(cont'd)

# Troubleshooting

## Flowcharts (cont'd)



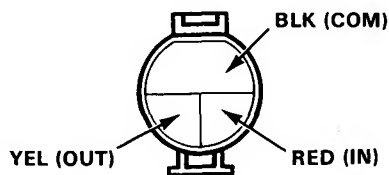
# **Diagnostic Trouble Code (DTC) 7-4: Rear Solenoid Related Problem**

**CAUTION:** Use only the digital multimeter to check the system.

Disconnect the 3P connector from rear solenoid.

Check for resistance between the RED and BLK terminals of rear solenoid.

**REAR SOLENOID CONNECTOR**



View from terminal side.

Is there 1-3  $\Omega$ ?

NO

**Replace the solenoid.**

YES

Check for resistance between the YEL and BLK terminals of rear solenoid.

Is there 1-3  $\Omega$ ?

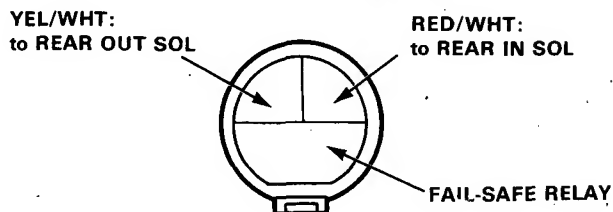
NO

**Replace the solenoid.**

YES

Disconnect the 12P connector from the ABS control unit.

**REAR SOLENOID CONNECTOR**



View from terminal side.

Check each wire for continuity between the ABS control unit and rear solenoid:  
RED/WHT: Rear Inlet  
YEL/WHT: Rear Outlet

Is there continuity ?

NO

**Repair open in wire between the rear solenoid and ABS control unit:  
RED/WHT: Rear Inlet  
YEL/WHT: Rear Outlet**

YES

Check each wire for continuity between the ABS control unit and body ground.  
RED/WHT: Rear Inlet  
YEL/WHT: Rear Outlet

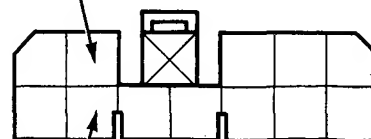
Is there continuity?

YES

**Repair short in wire:  
RED/WHT: Rear Inlet  
YEL/WHT: Rear Outlet**

NO

**RED/WHT: from REAR IN SOL**



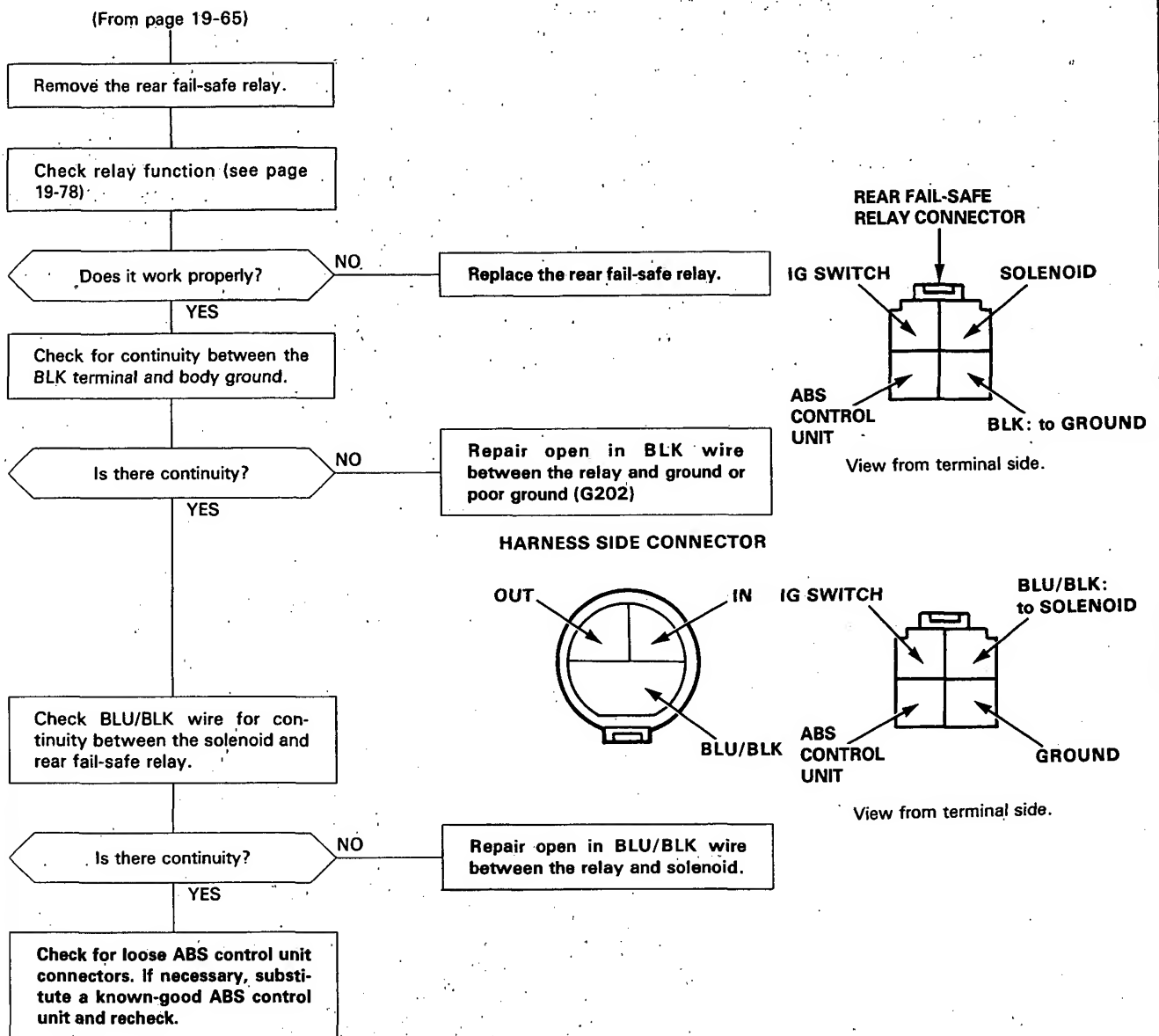
View from wire side.

(To page 19-66)

(cont'd)

# Troubleshooting

## Flowcharts (cont'd)



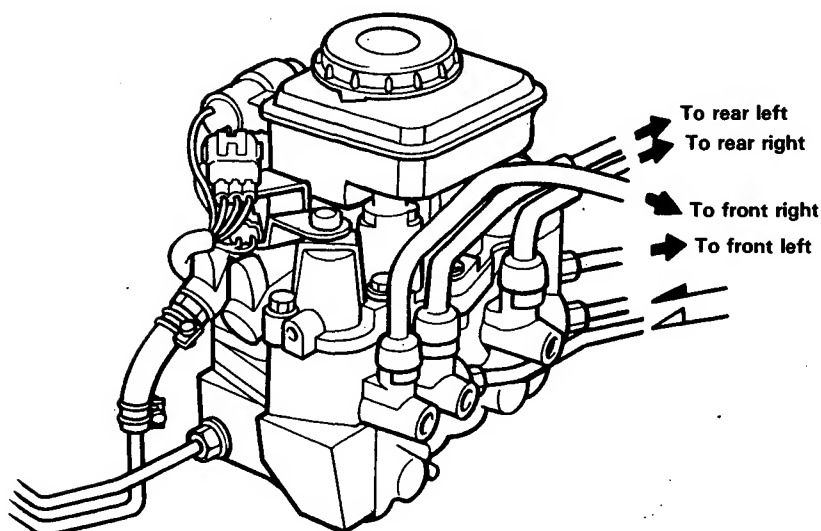
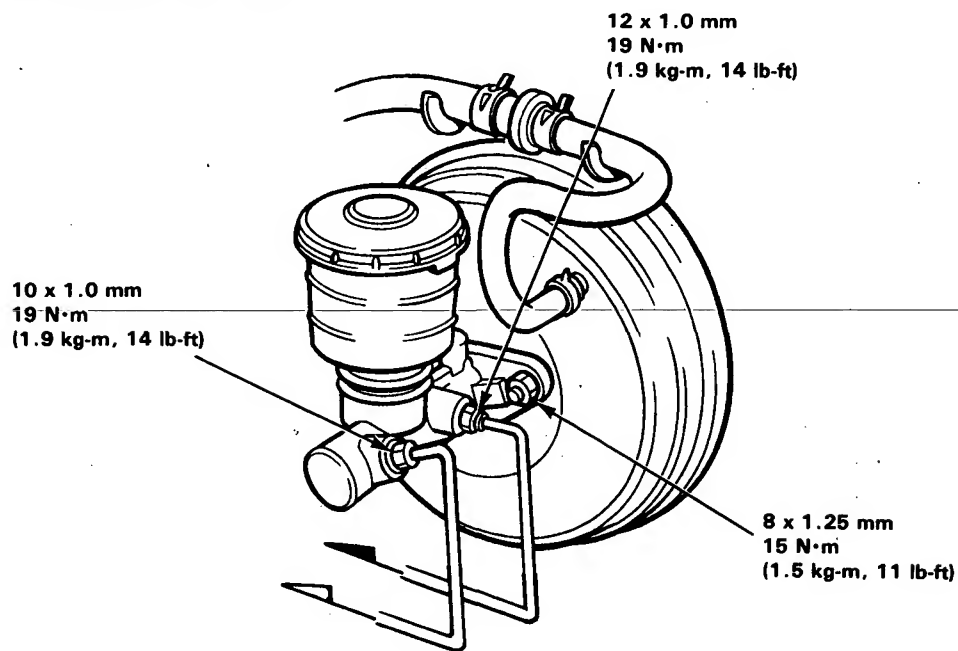
# Hydraulic System

## Hydraulic Connections



### CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.



# Hydraulic System

## Relieving Accumulator/Line Pressure

**▲ WARNING** Use the Bleeder T-wrench before disassembling the parts shaded in the illustration.

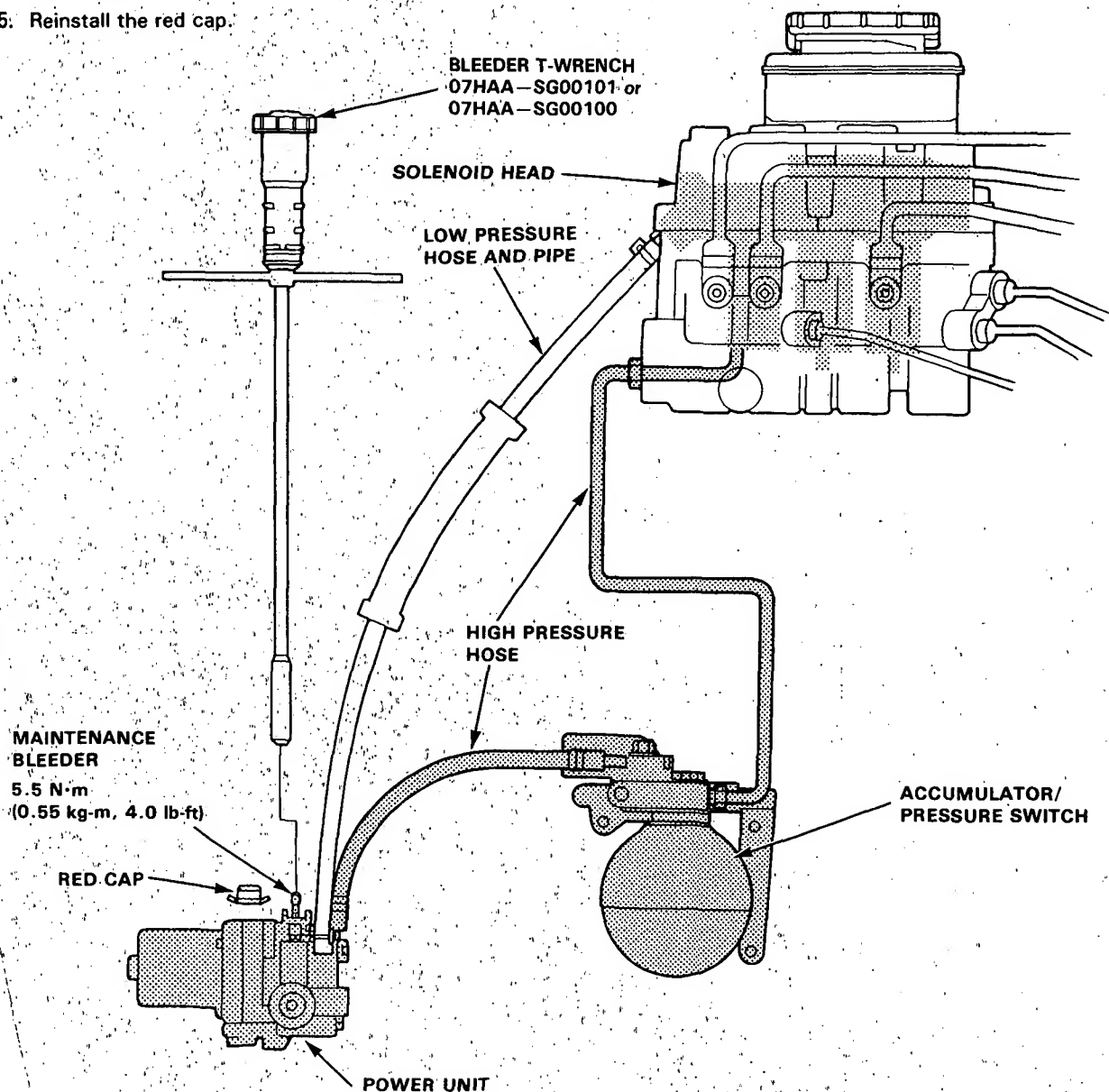
1. Drain the brake fluid from the master cylinder and modulator reservoir thoroughly.
2. Remove the red cap from the bleeder on the top of the power unit.
3. Install the special tool on the bleeder screw and turn it out slowly 90° to collect high-pressure fluid into reservoir. Turn the special tool out one complete turn to drain the brake fluid thoroughly.
4. Retighten the bleeder screw and discard the fluid.
5. Reinstall the red cap.

### Reservoir Brake Fluid Draining

1. Draining brake fluid from modulator reservoir:  
The brake fluid may be sucked out through the top of the modulator reservoir with a syringe. It may also be drained through the pump joint after disconnecting the pump hose.
2. Drain the brake fluid from master cylinder:  
Loosen the bleed screw and pump the brake pedal to drain the brake fluid from the master cylinder.

### ▲ WARNING

- High-pressure fluid will squirt out if the tube shaded is removed or the solenoid head 8 mm and 10 mm bolts are loosened.
- To drain high-pressure brake fluid, follow the procedure on this page.





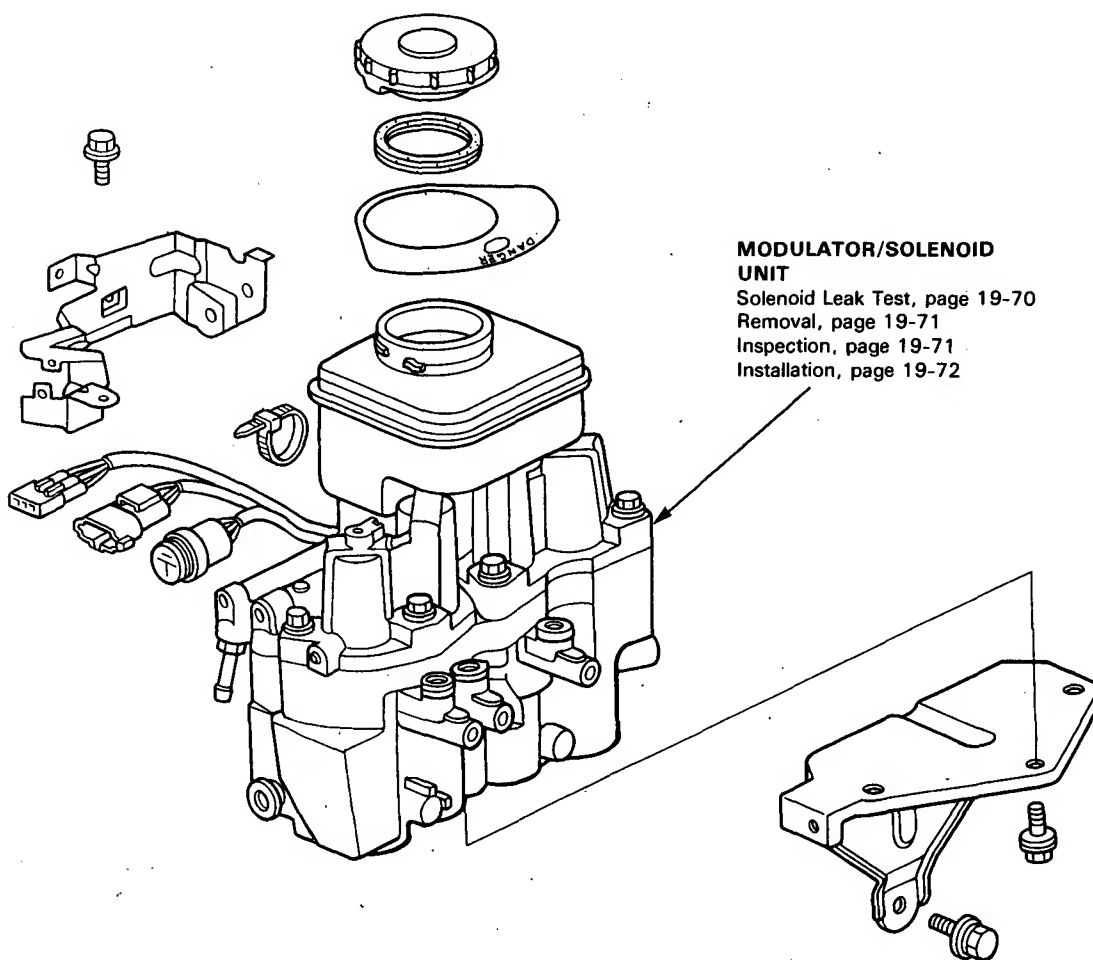
# Modulator/Solenoid Unit



## Index/Inspection

### CAUTION:

- Be careful not to bend or damage the brake pipes when removing the modulator/solenoid unit.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.



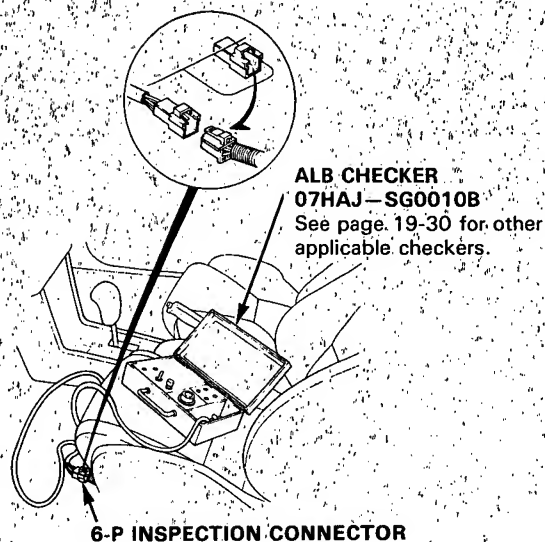
### MODULATOR/SOLENOID UNIT

Solenoid Leak Test, page 19-70  
Removal, page 19-71  
Inspection, page 19-71  
Installation, page 19-72

# Solenoids

## Leak Test

1. Disconnect the 6-P inspection connector from the connector cover on the cross-member under the driver seat and connect the inspection connector to the ALB checker.

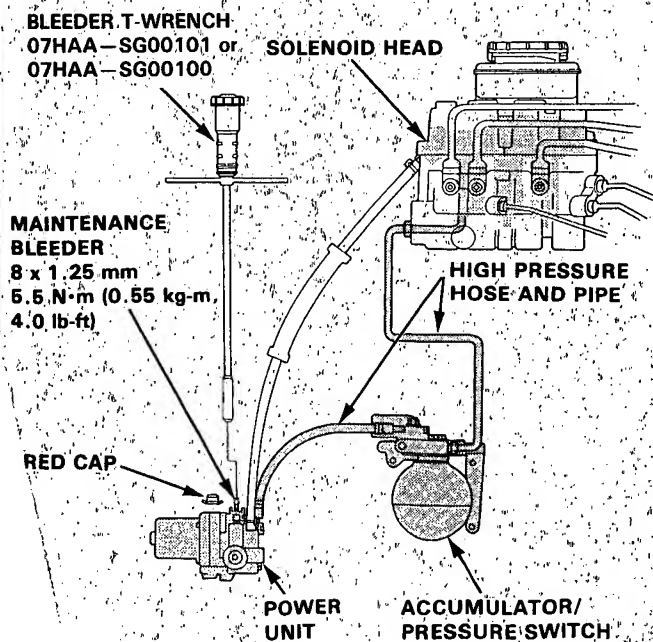


**CAUTION:** Place the vehicle on level ground with the wheels blocked. Put the transmission in neutral for manual transmission models, and in **P** position for automatic transmission models.

2. Remove the modulator reservoir filter, then fill the reservoir to the MAX level.

**NOTE:** Do not reuse aerated brake fluid that has been bled from the power unit.

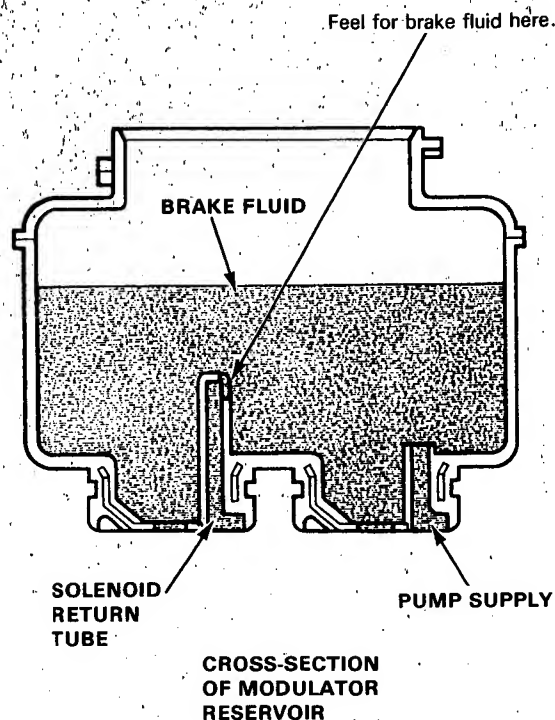
3. Bleed high-pressure fluid from the maintenance bleeder with the special tool.



4. Start the engine and release the parking brake.

5. Turn the Mode Selector to 1 and press the Start Test button.

6. While the ABS pump is running, place your finger over the top of the solenoid return tube in the modulator reservoir.



- If you can feel brake fluid coming from the return tube, one of the solenoids is leaking. Go to step 7.

- If you can't feel brake fluid coming from the return tube, the solenoids are OK. Reinstall the modulator reservoir filter and refill the reservoir to the MAX level.

7. Bleed high-pressure fluid from the maintenance bleeder with the special tool, then run through modes 3 and 6 with the ALB Checker. Repeat this three or four times.

8. Repeat steps 5 and 6.

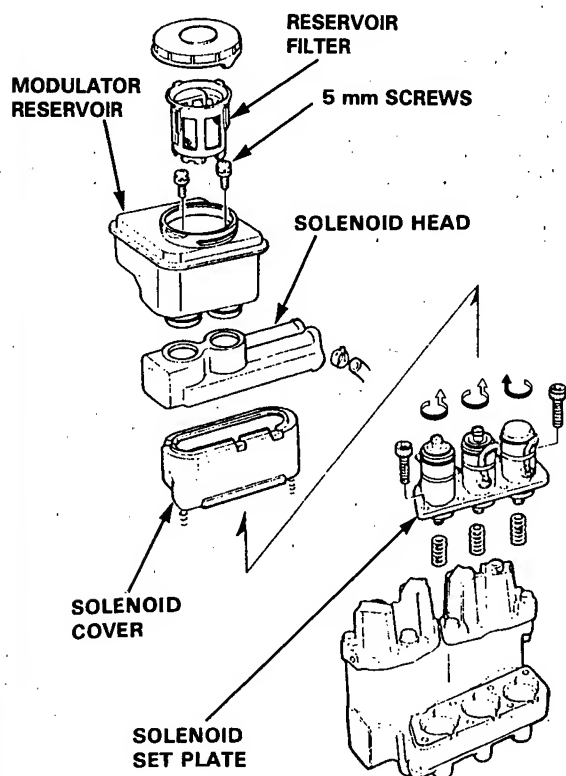
- If the solenoid leakage has stopped, reinstall the modulator reservoir filter and refill the reservoir to the MAX level.

- If one of the solenoids is still leaking, see Solenoid Inspection on page 19-71.

## Removal

1. Drain the brake fluid from the modulator reservoir.
2. Relieve the high pressure fluid (see page 19-68).
3. Disconnect the inlet hose.
4. Remove the reservoir filter.
5. Remove the 5 mm screws and remove the modulator reservoir.
6. Screw the 6 mm bolt into the threaded hole in the center of the solenoid head, raise the solenoid head and remove it.
7. Remove the solenoid cover.
8. Remove the hexagonal socket screws and loosen the solenoid set plate.
9. Turn the solenoid valves several times until they move freely and turn the solenoid valves 1/2 turn to align their projection with the cutout in the set plate. Remove the solenoid valves together with the set plate.

**CAUTION:** The solenoid valves are delicate parts. Be careful not to drop them.



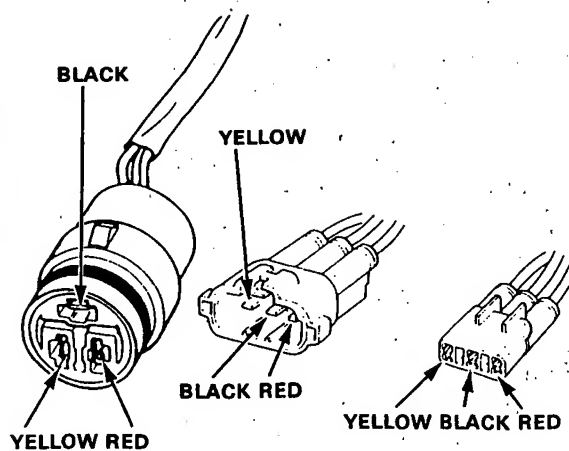
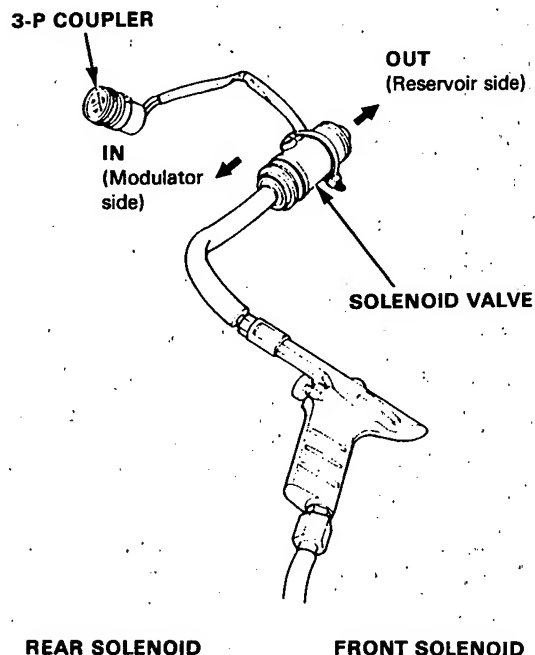
## Inspection

1. Connect a tube to the inlet of the solenoid valve. Apply compressed air to the solenoid valve through the tube.
2. Check the solenoid valve for proper operation by connecting a 12 V fully charged battery to the 3-P coupler terminals:

**Voltage not applied:** There should be no air flow.

**Black — Red:** There should be air flow through IN and OUT.

**Black — Yellow:** There should be air flow through IN.

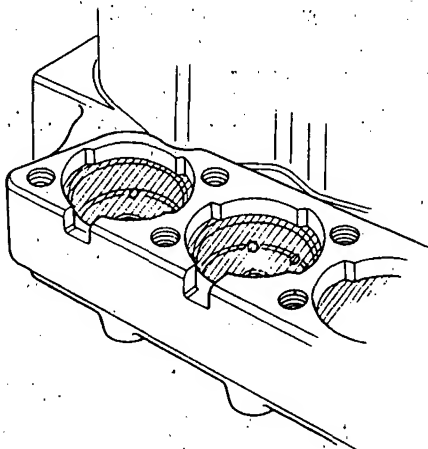


# Solenoids

## Installation

1. Fill the modulator body with brake fluid up to the step in the solenoid mounting hole.

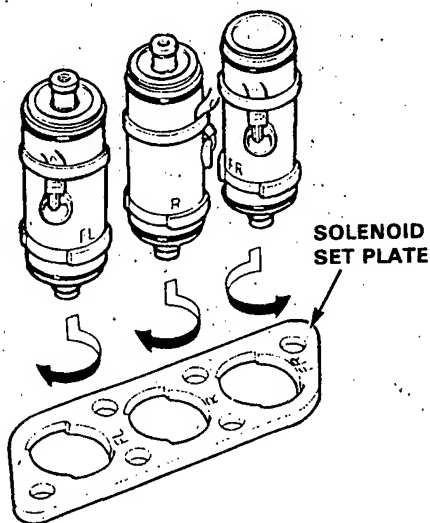
**NOTE:** On solenoid valve assembly, place shop rags over the solenoid valve and under the modulator valve to prevent the brake fluid from spilling on the valve.



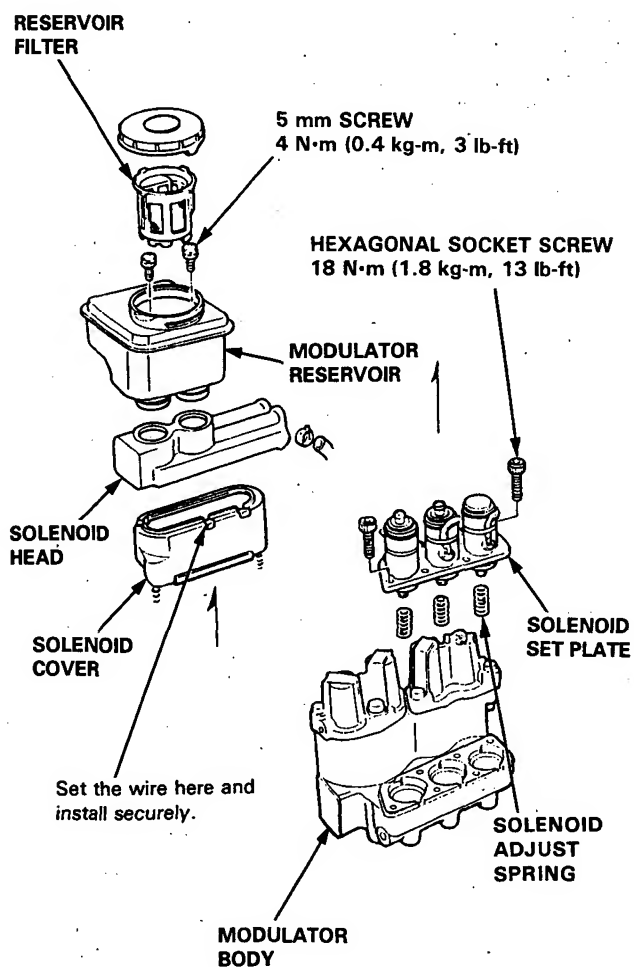
2. Coat the O-ring with the clean brake fluid and install the O-ring onto the solenoid valve.
3. Install solenoid valves in the set plate.

**WARNING** Each solenoid valve and set plate are marked for correct installation. If the solenoid valves are interchanged, the system will not work properly. Refer to the marks and be sure to install them in correct positions.

- Align the projection on the solenoid valve with the cutout in the set plate and turn the valve 1/2 turn.



4. Install the solenoid adjust springs in the modulator body.
5. Install the solenoid valves and set plate and secure with the hexagonal socket screws.
6. Install the solenoid cover and solenoid head.
7. Install the modulator reservoir.
8. Install the reservoir filter.
9. Connect the low pressure hose.



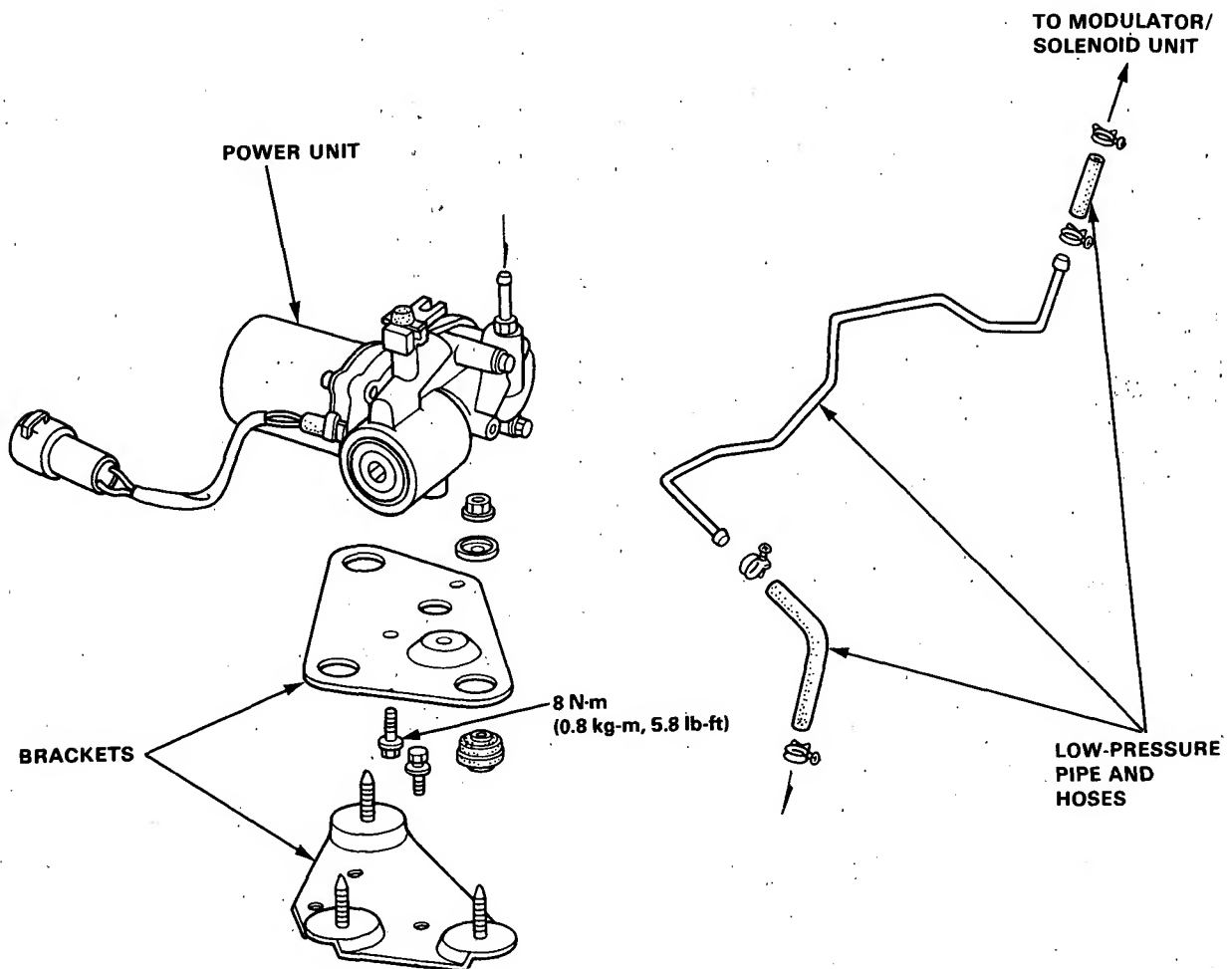
# Power Unit



## Index/Inspection

### CAUTION:

- Be careful not to bend or damage the brake pipe when removing the power unit.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Do not try to disassemble the parts in the power unit assembly. Replace the power unit assembly with a new part if necessary.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only DOT 3 or 4 clean brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.

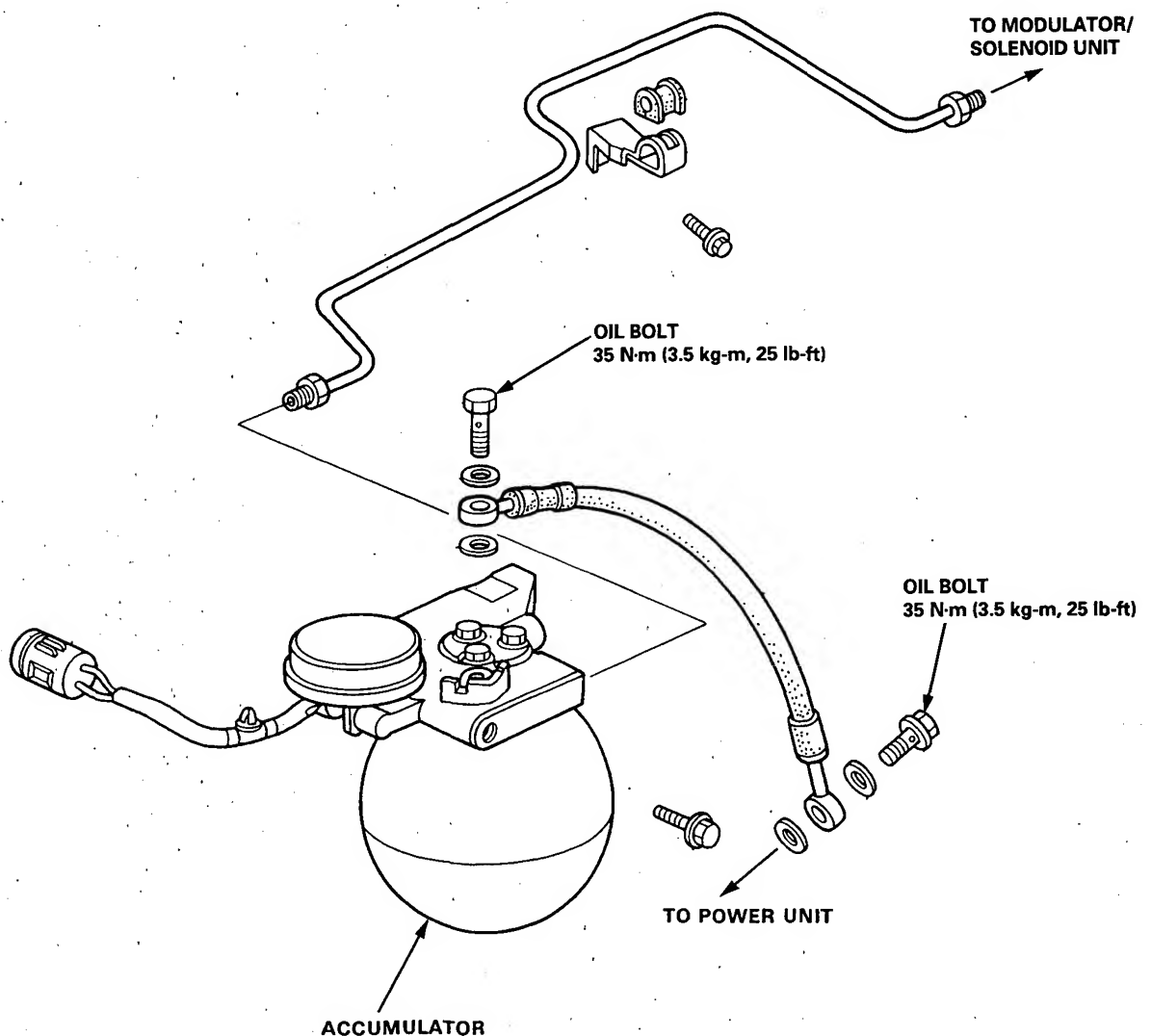


# Accumulator

## Index/Inspection

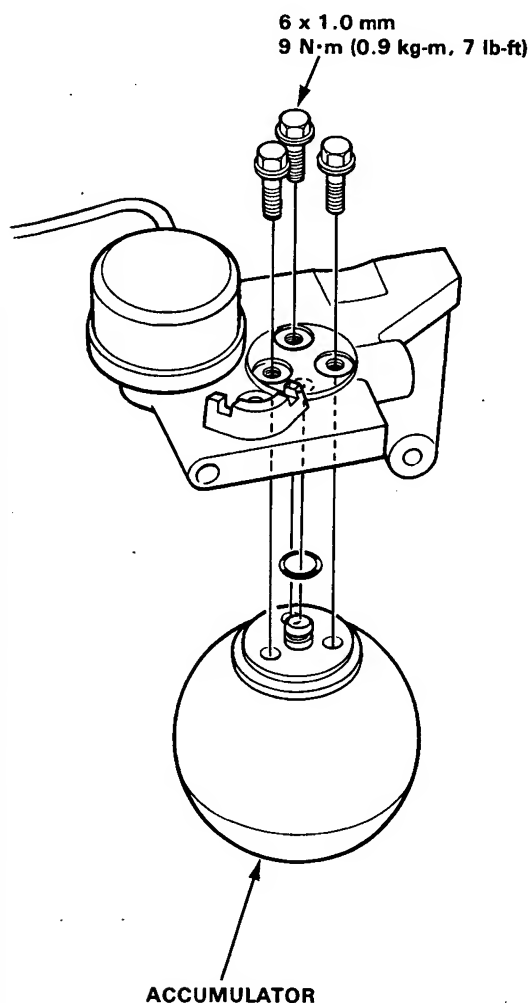
### CAUTION:

- Be careful not to bend or damage the brake pipe when removing the accumulator.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace the accumulator assembly with a new part if necessary.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.



## Accumulator/Pressure Switch Removal

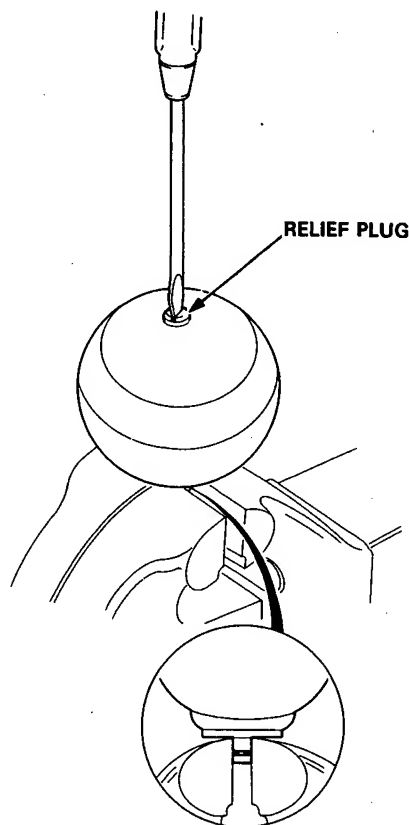
1. Drain the high pressure brake fluid from the power unit (see page 19-68).
2. Remove three 6 mm flange bolts, then remove the accumulator from the accumulator bracket.



## Accumulator Disposal

**⚠ WARNING** The accumulator contains high pressure nitrogen gas, do not puncture expose to flame or attempt to disassemble the accumulator or it may explode; severe personal injury may result.

1. Secure the accumulator in a vise so that the relief plug points straight up.
2. Slowly turn the plug 3-1/2 turns and then wait 3 minutes for all pressure to escape.
3. Remove the plug completely and dispose of the accumulator.



# Master Cylinder

## Inspection

### CAUTION:

- Be careful not to bend or damage the brake pipes when removing the master cylinder.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Do not try to disassemble the parts in the master cylinder assembly. Replace the master cylinder assembly with a new part if necessary.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.

#### RESERVOIR CAP

Check for blockage of vent holes.

#### RESERVOIR SEAL

Check for damage or deterioration.

#### MASTER CYLINDER

Check bore for leaks or damage.

GREASE

SILICONE GREASE

#### ROD SEAL

Check for damage or deterioration.

GREASE

SILICONE GREASE

8 x 1.25 mm  
15 N·m (1.5 kg-m, 11 lb-ft)

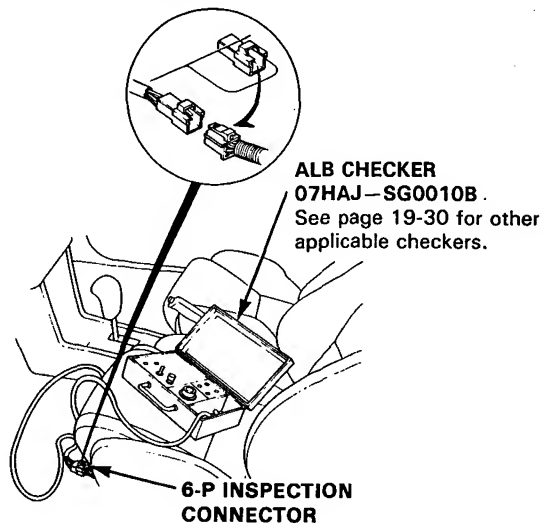


# Bleeding



## Air Bleeding With ALB Checker

1. Disconnect the 6-P inspection connector from the connector cover on the cross-member under the driver's seat and connect the inspection connector to the ALB checker.



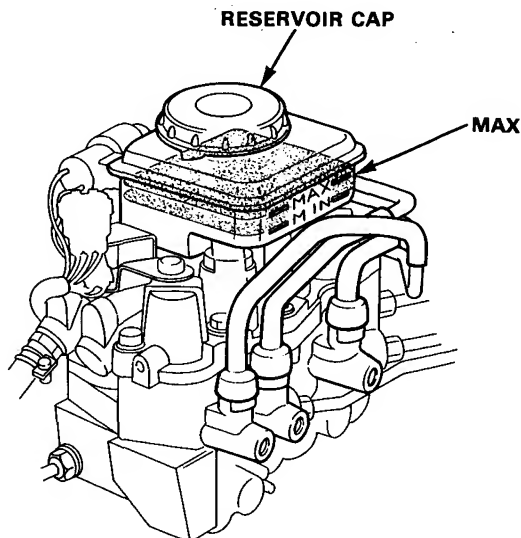
**CAUTION:** Place the vehicle on level ground with the wheels blocked. Put the transmission in neutral for manual transmission models, and in **P** position for automatic transmission models.

2. Fill the modulator reservoir to the MAX level.

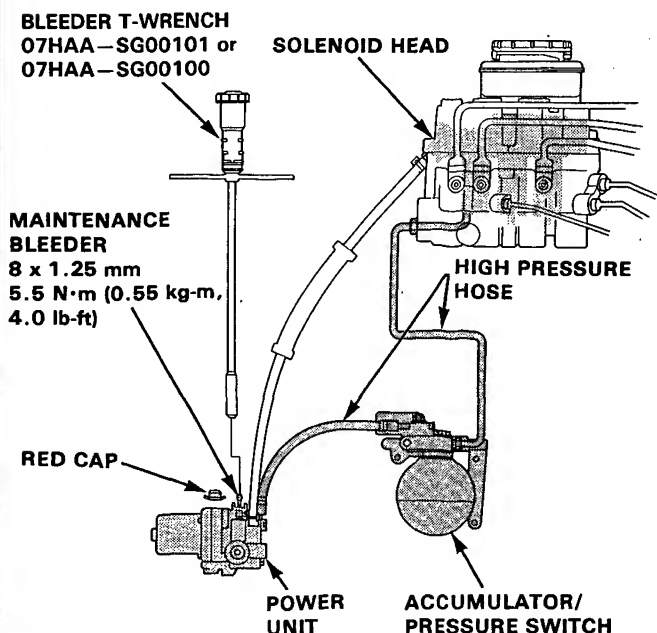
**NOTE:** Do not reuse aerated brake fluid that has been bled from the power unit.

3. Bleed high-pressure fluid from the maintenance bleeder with the special tool.

4. Start the engine and release the parking brake.
5. Turn the Mode Selector to 2, 3, 4 and 5, depress the brake pedal firmly and press the Start Test button.  
There should be at least two kickbacks. If not, repeat steps 2 through 5, as necessary.
6. Fill the modulator reservoir up to the MAX level.



7. Install the reservoir cap.
8. Check the anti-lock brake system function in all modes by using the ALB checker.



# Electronic Components

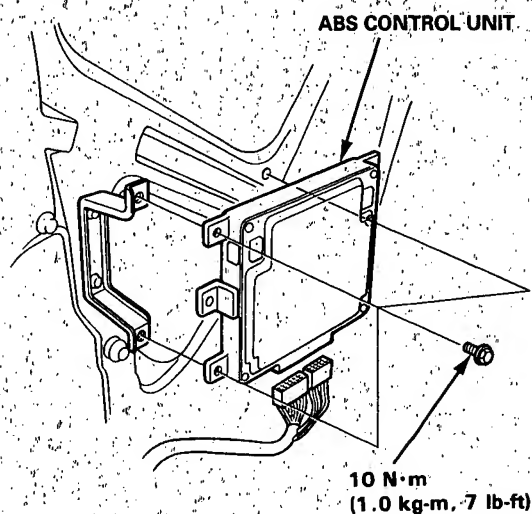
## ABS Control Unit Replacement

Remove the ABS control unit mounting bolts, then remove the ABS control unit.

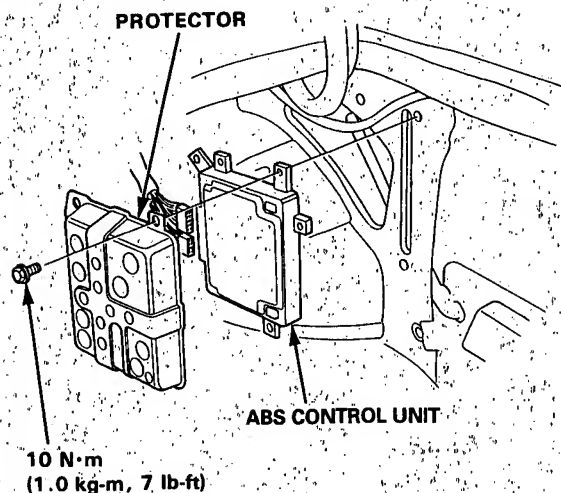
### CAUTION:

- If the ABS control unit mounting bolts are removed, the ABS control unit's memory is cleared.
- Handle the ABS control unit with care.

(3D:)



(4D:)



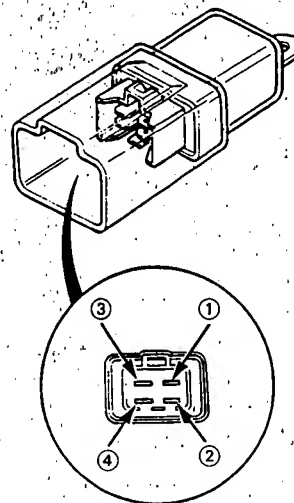
Install in the reverse order of removal.

NOTE: Check the anti-lock brake system function by turning the ignition switch ON.

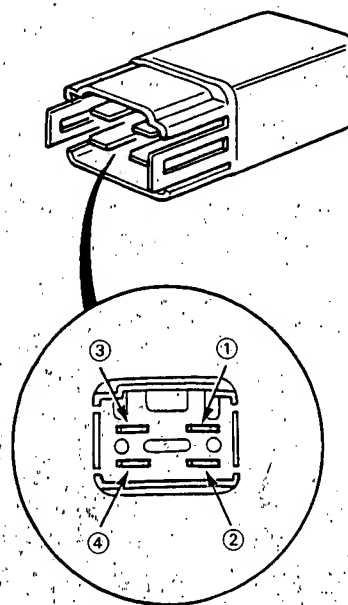
## Fail-safe Relays/Motor Relay Inspection

1. Check for continuity between terminals ③ and ④.  
There should be no continuity.
2. Connect a 12V battery across terminals ① and ②.  
There should be continuity between terminals ③ and ④.

Fail-safe Relays



Motor Relay



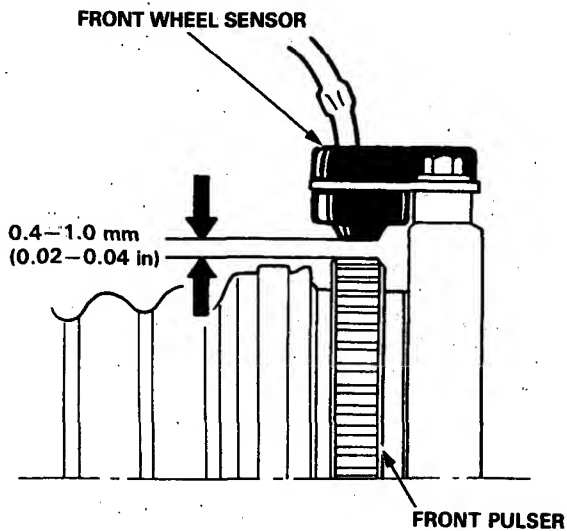
# Pulsers/Sensors



## Inspection

### Front

1. Check the pulser for chipped or damaged teeth.



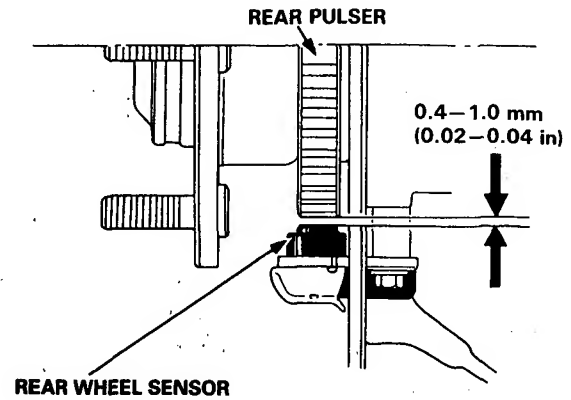
2. Measure air gap between the sensor and pulser all the way around while rotating the driveshaft by hand.

**STANDARD: 0.4-1.0 mm (0.02-0.04 in)**

**NOTE:** If the gap exceeds 1.0 mm (0.04 in), the probability is a distorted knuckle which should be replaced.

### Rear

1. Check the rear pulser for chipped or damaged teeth.



2. Measure the air gap between the sensor and pulser all the way around while rotating the hub bearing unit by hand.

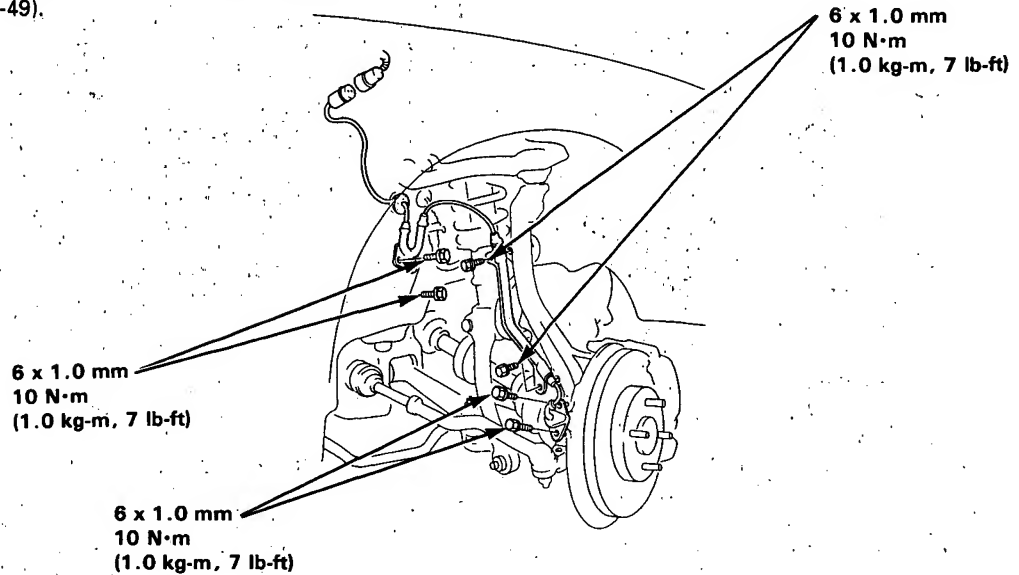
**STANDARD: 0.4-1.0 mm (0.02-0.04 in)**

**NOTE:** If the gap exceeds 1.0 mm (0.04 in), the probability is a distorted knuckle which should be replaced.

## Front Wheel Sensor Replacement

### NOTE:

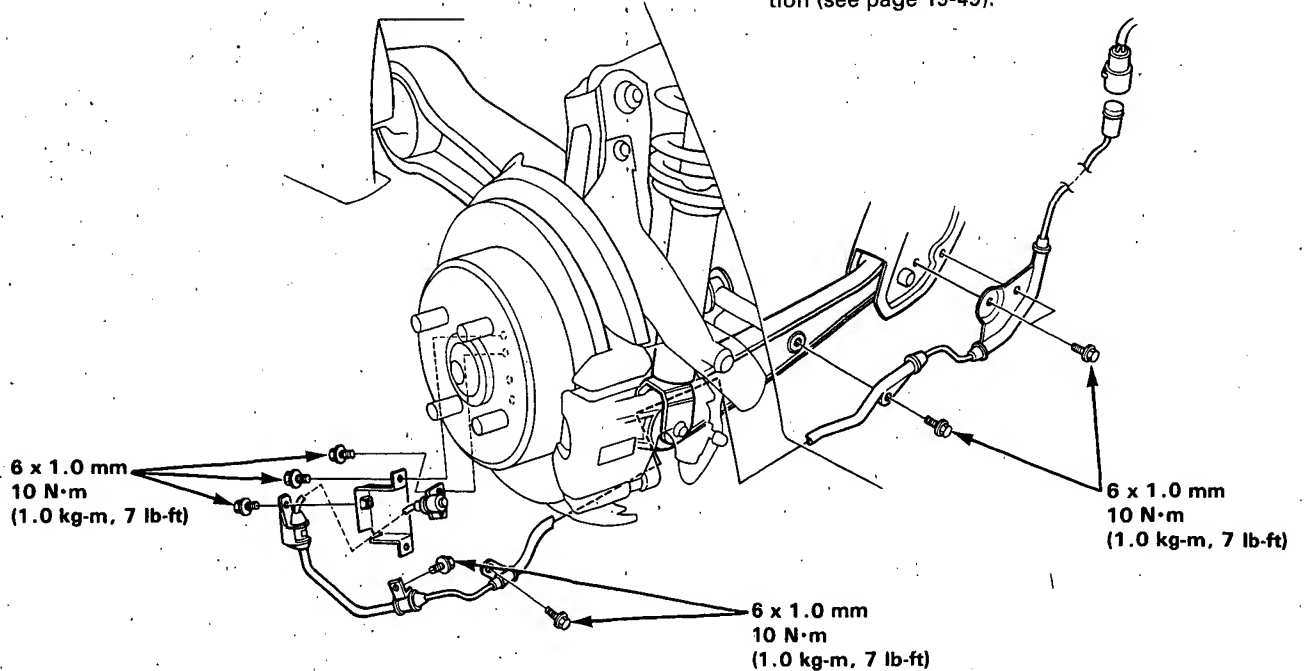
- Be careful when installing the sensors to avoid twisting the wires. Use the white line on the wires as guide.
- After sensor replacement confirm proper operation (see page 19-49).



## Rear Wheel Sensor Replacement

### NOTE:

- Be careful when installing the sensors to avoid twisting the wires. Use the white line on the wires as guide.
- After sensor replacement confirm proper operation (see page 19-49).



<b>Bumpers</b>		<b>Moonroof</b>	
Front .....	20-78	Index .....	20-54
Rear .....	20-79	Replacement/Adjustment .....	20-55
<b>Carpet/Door Sill Molding</b> .....	20-74	<b>Rear Emblems</b> .....	20-88
<b>Console</b> .....	20-73	<b>Seats</b>	
<b>Dashboard</b>		Front Disassembly .....	20-64
Component Removal/Installation .....	20-75	Front Cover Replacement .....	20-65
Replacement .....	20-76	Rear Seat Replacement	
<b>Doors</b>		Hatchback .....	20-66
Index .....	20-2	Sedan .....	20-67
Disassembly (Hatchback) .....	20-5	<b>Seat Belts</b>	
(Sedan) .....	20-9	Front Replacement (USA) .....	20-68
Assembly .....	20-15	Front Replacement (Canada) .....	20-69
Glass Adjustment .....	20-17	Rear Replacement .....	20-70
Position Adjustment .....	20-26	Inspection .....	20-71
Striker Adjustment .....	20-26	Child Seat Anchor Plate .....	20-72
<b>Frame Repair Chart</b> .....	20-90	<b>Sub-frame</b> .....	20-89
<b>Fuel Lid</b>		<b>Tailgate</b>	
Opener/Latch Replacement .....	20-84	Replacement/Adjustment .....	20-82
Opener Cable Replacement .....	20-85	Opener/Latch Replacement .....	20-84
<b>Headliner</b> .....	20-63	Opener Cable Replacement .....	20-85
<b>Hood</b>		Spoiler Replacement .....	20-87
Replacement/Adjustment .....	20-80	<b>Trunk Lid</b>	
Opener/Latch Replacement .....	20-81	Replacement/Adjustment .....	20-83
Opener Cable Replacement .....	20-85	Opener/Latch Replacement .....	20-84
<b>Interior Trim</b>		Opener Cable Replacement .....	20-85
Hatchback .....	20-61	<b>Windshield, Rear Window</b>	
Sedan .....	20-62	<b>Quarter Glass</b>	
<b>Mirrors</b>		Index .....	20-29
Power Door Mirror Replacement .....	20-27	Windshield .....	20-31
Mirror Glass Replacement .....	20-27	<b>Rear Window</b>	
Manual Door Mirror Replacement .....	20-28	Hatchback .....	20-36
Mirror Glass Replacement .....	20-28	Window Molding Replacement .....	20-42
Rearview Mirror .....	20-72	Sedan .....	20-44
<b>Moldings</b>		Quarter Glass .....	20-49
Side Window Molding/Weatherstrip .....	20-86		
Side Moldings .....	20-87		

NOTE: The radio may have a coded theft protection circuit. Be sure to get the customer's code number before

- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse.
- Removing the radio.

After service, reconnect power to the radio and turn it on.

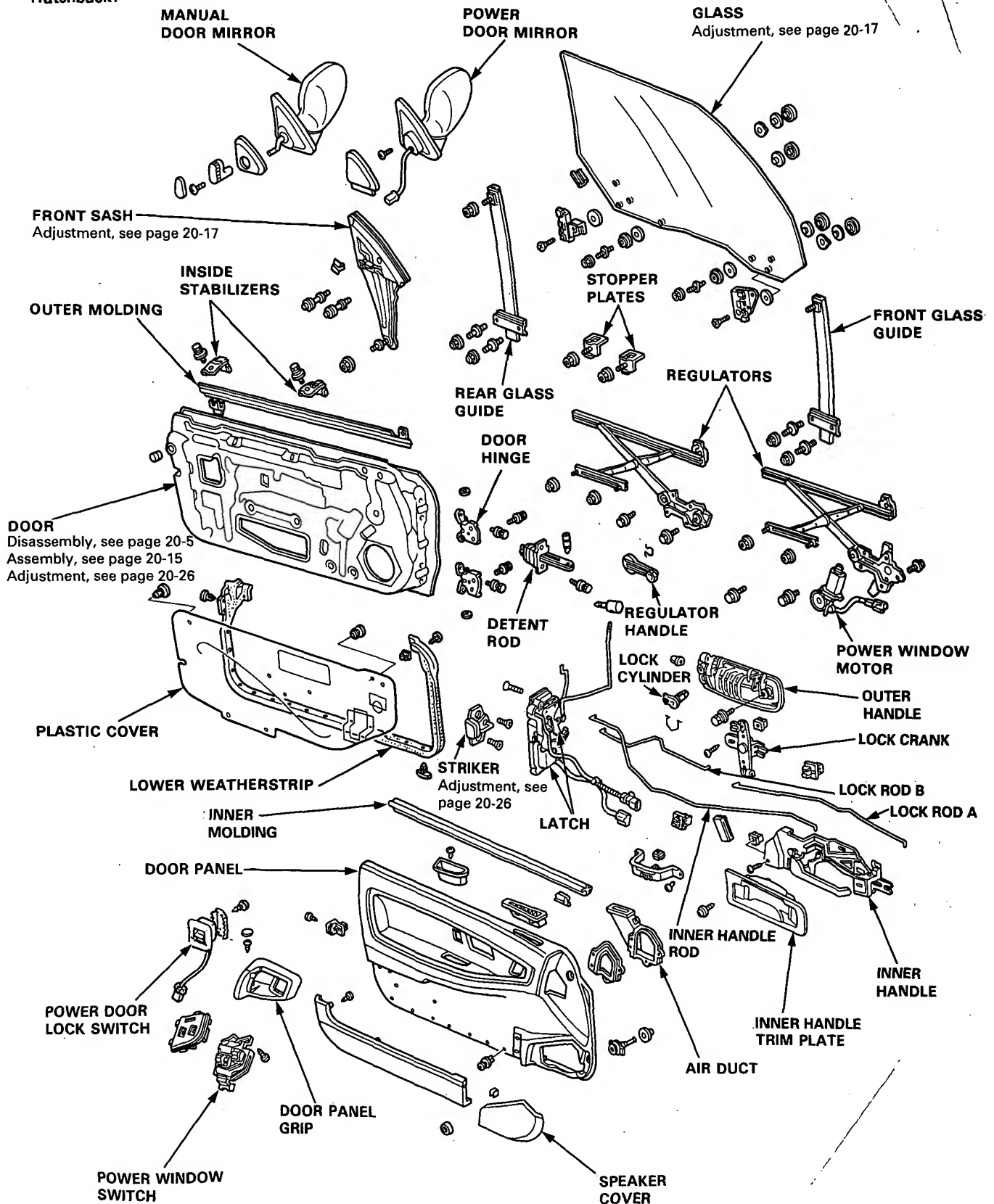
When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.



# Doors

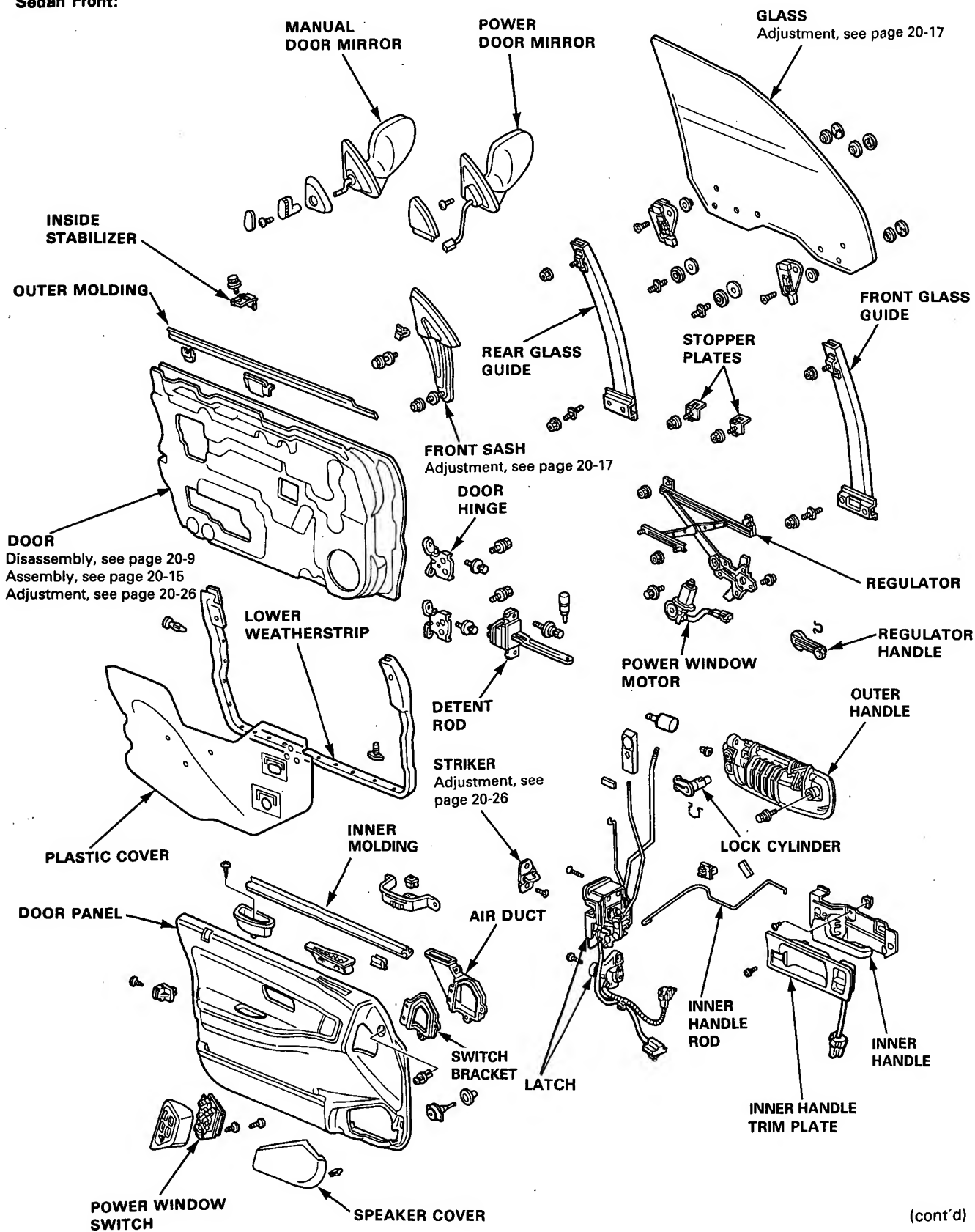
## Index

Hatchback:





**Sedan Front:**

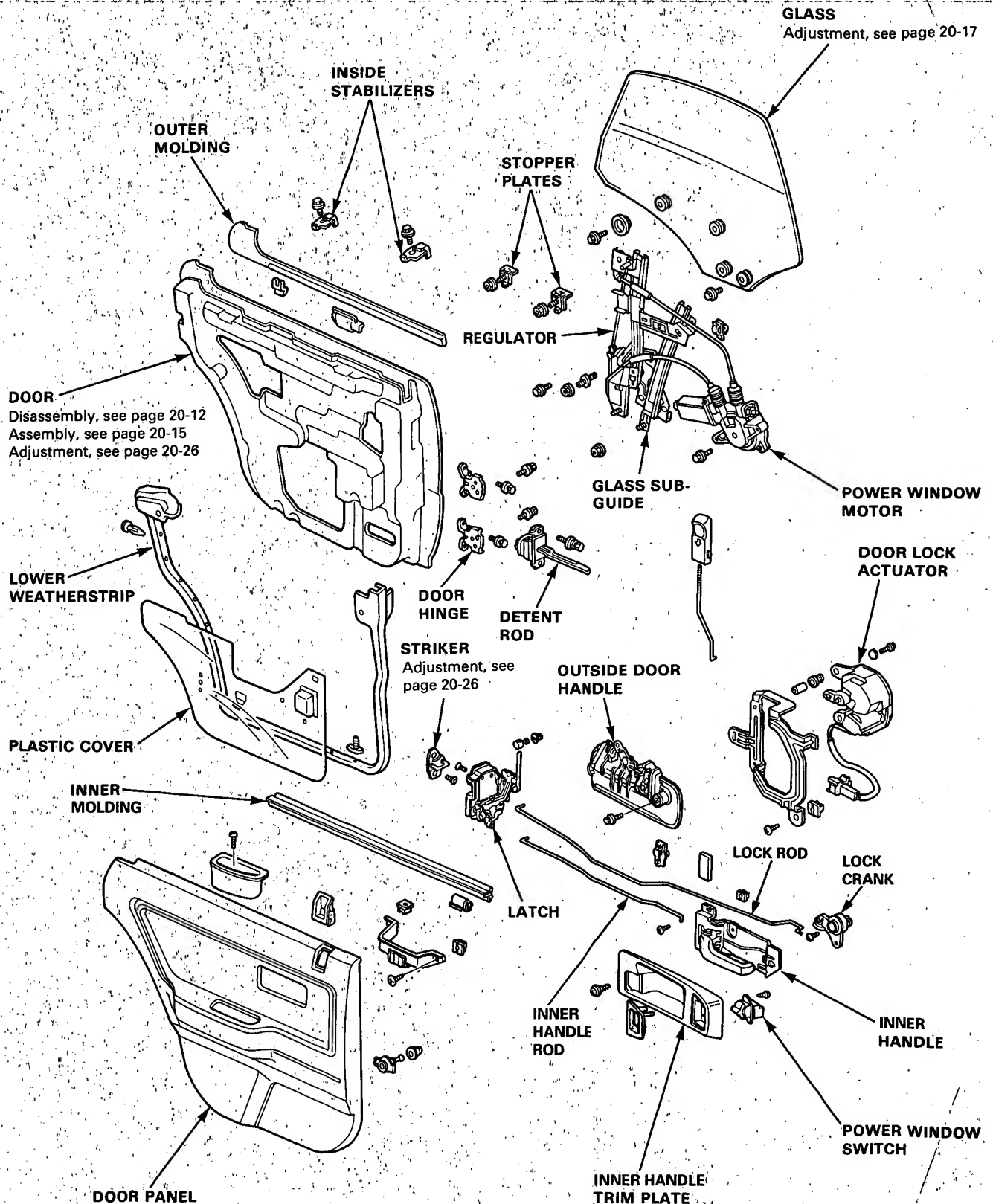


(cont'd)

# Doors

## Index (cont'd)

### Sedan Rear:





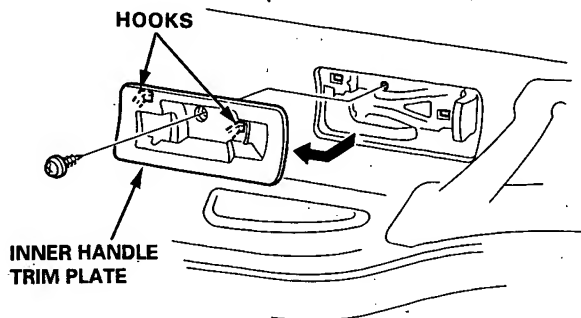


## Disassembly

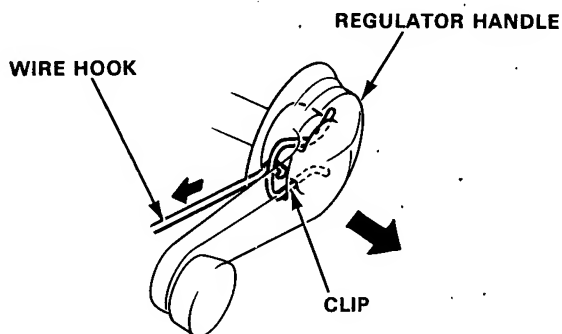
### Hatchback:

1. Remove the screw, then carefully remove the inner handle trim plate.

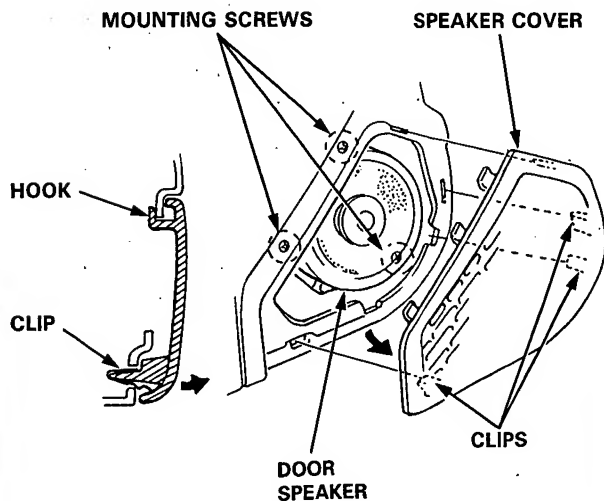
NOTE: Take care not to scratch the inner handle trim plate.



2. If applicable, remove the regulator handle by pulling the clip out with a wire hook.



NOTE: When replacing the door speaker, remove the speaker cover and mounting screws.

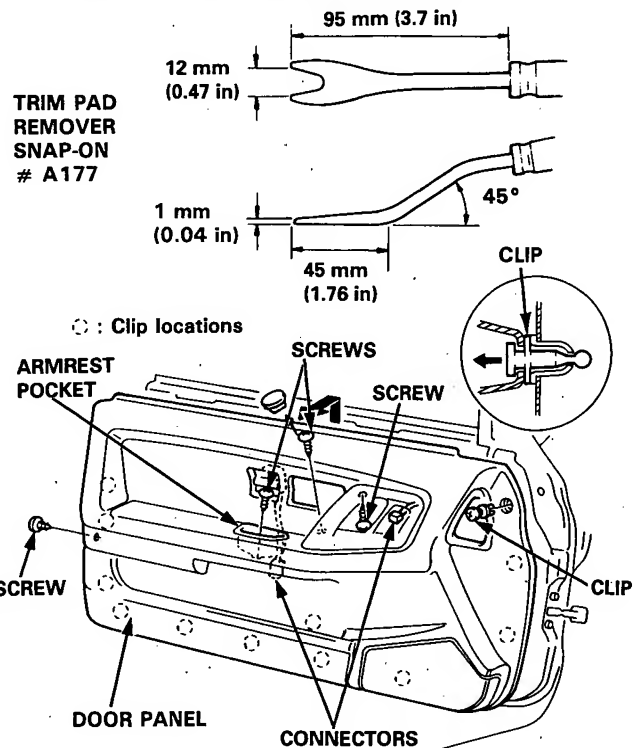


3. Remove the screw and carefully pry up the armrest pocket.

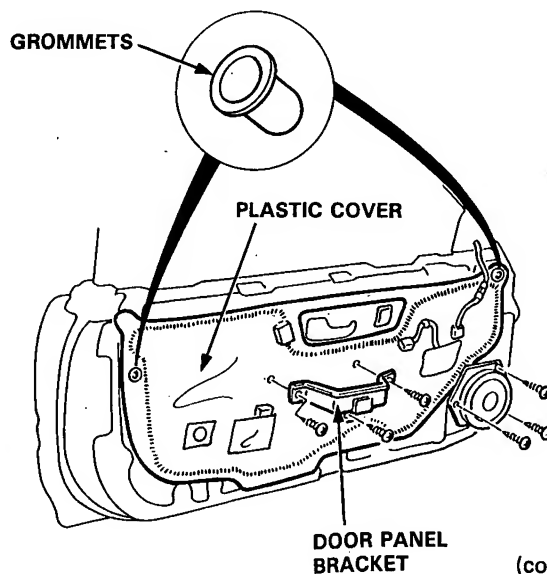
Remove the screws and clips (see trim pad remover) attaching the door panel.

Remove the door panel by pulling it upward and disconnect the power window connector and power door lock connector.

NOTE: Remove the panel with as little bending as possible to avoid creasing or breaking it.



4. Carefully remove the plastic cover.



(cont'd)

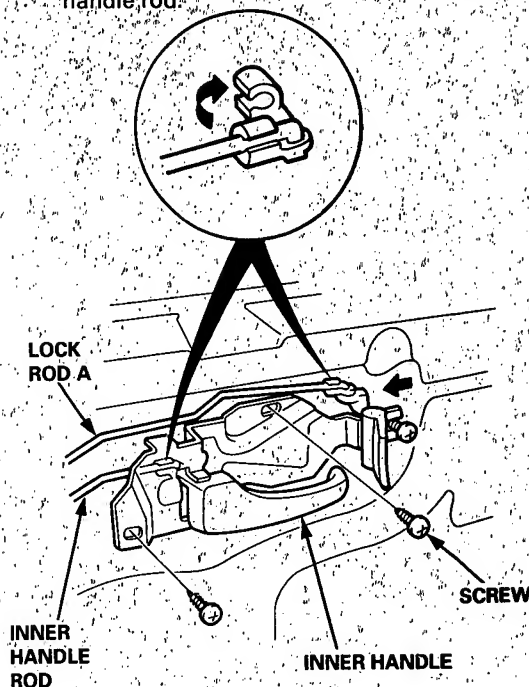
# Doors

## Disassembly (cont'd)

- Remove the screws and disconnect the lock rod A and inner handle rod, then remove the inner handle.

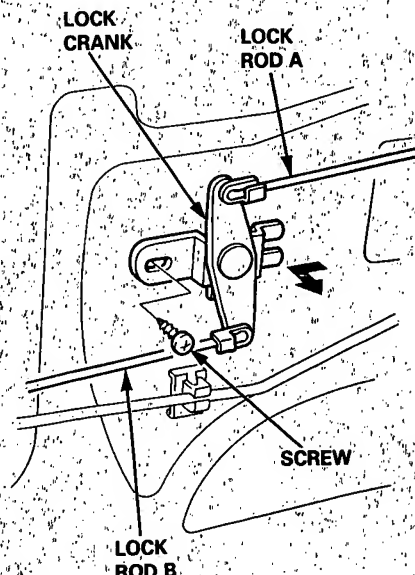
### NOTE:

- When installing, make sure the rods are fastened correctly.
- Take care not to bend the lock rod A and inner handle rod.



- Remove the screw, disconnect the lock rod A and B, then remove the lock crank.

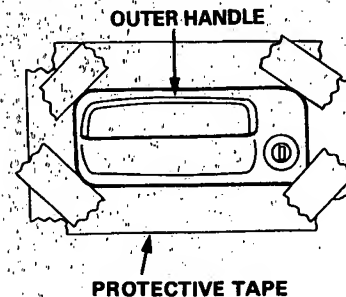
NOTE: Take care not to bend the lock rod A and B.



- Reconnect the window switch to operate the regulator.

- Raise the glass fully.

- Use protective tape around the edge of the outer handle to prevent scratching the paint.



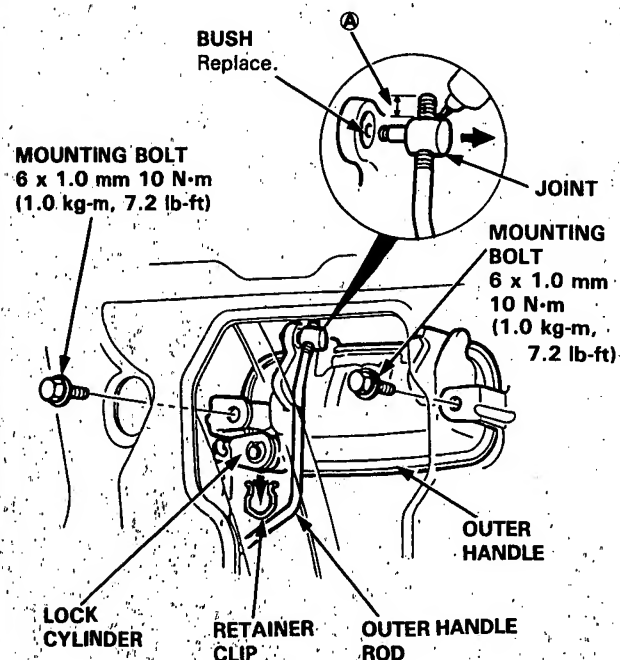
- Pull out the retainer clip, then remove the lock cylinder.

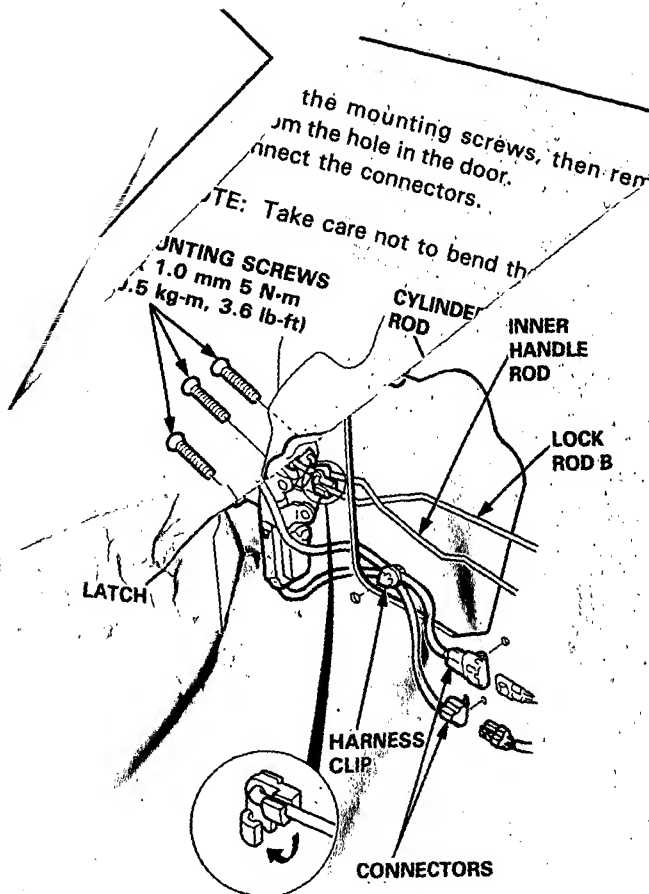
- Remove the mounting bolts. Pull the outer handle out, then pry the outer handle rod out of its joint using a flat tip screwdriver.

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

### NOTE:

- To ease reassembly, note the location (A) of the outer handle rod on the joint before disconnecting it.
- Take care not to damage the joint and outer handle rod.

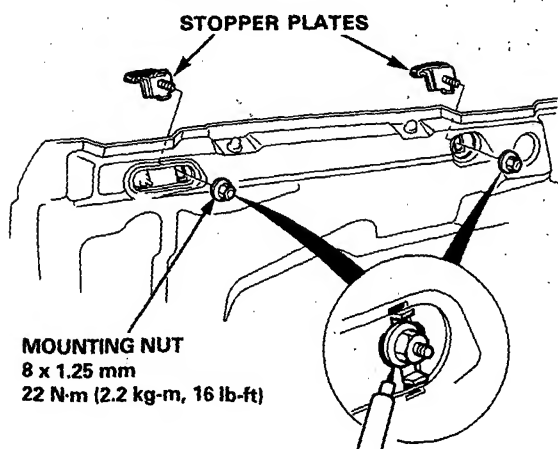




NOTE: When installing, make sure the rods are fastened correctly.

13. Lower the glass and remove the mounting nuts, then remove the stopper plates.

NOTE: Scribe a line around the mounting nuts to show the original adjustment.

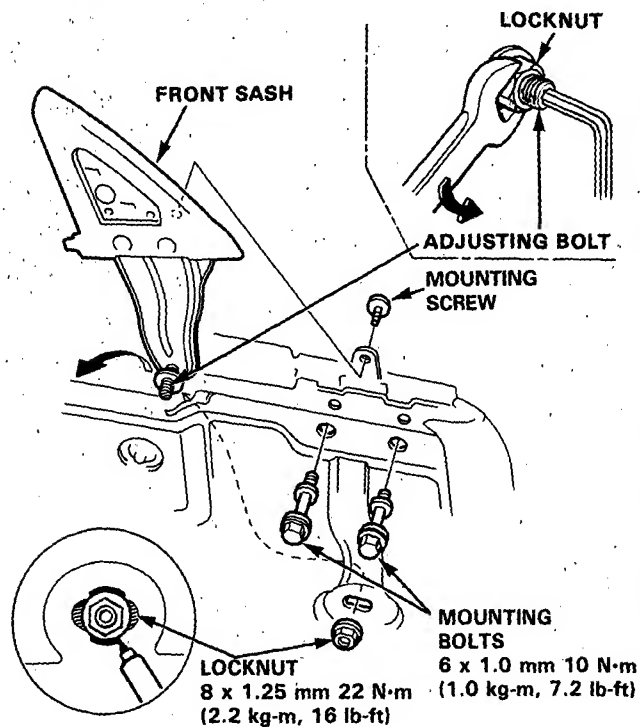


14. Remove the door mirror (see pages 20-27, 28).

the mounting bolts, mounting screw and locknut, then remove the front sash.

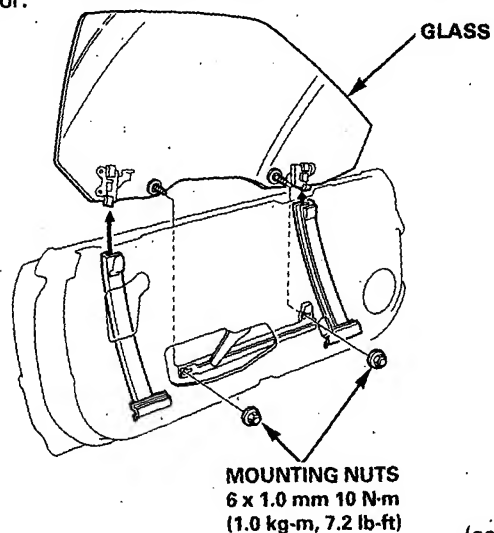
**NOTE:**

- Hold the adjusting bolt with a hex wrench when removing the locknut.
- Scribe a line around the locknut to show the original adjustment.



16. Carefully lower the glass until you can see its mounting nuts, then remove the mounting nuts. Pull the glass out through the window slot.

NOTE: Take care not to drop the glass inside the door.



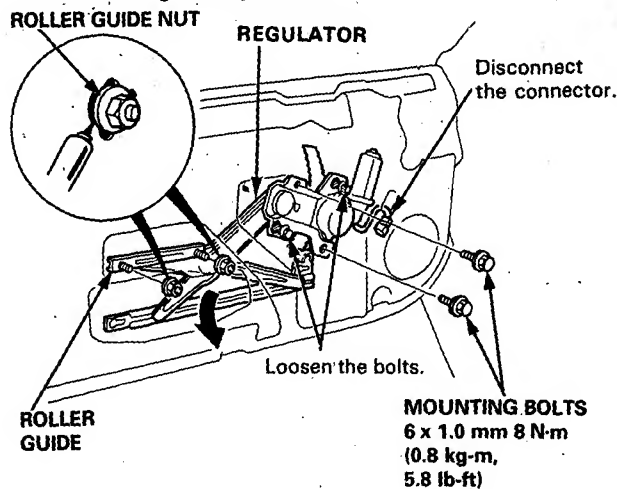
(cont'd)

# Doors

## Disassembly (cont'd)

17. Remove the roller guide bolts. Remove and loosen the mounting bolts, then remove the regulator through the center hole in the door.

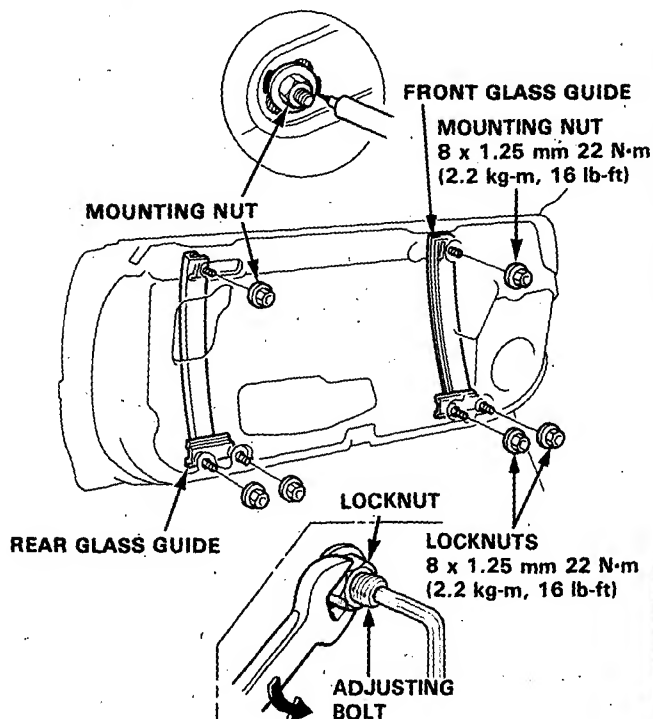
NOTE: Scribe a line around the roller guide nuts to show the original adjustment.



18. Remove the mounting nuts and locknuts, then remove the front and rear glass guides.

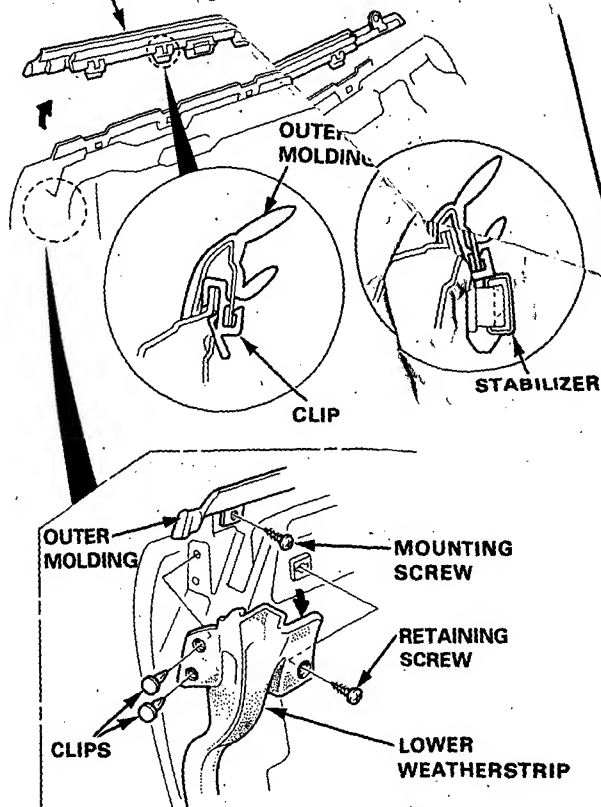
NOTE:

- Hold the adjusting bolts with a hex wrench when removing the locknuts.
- Scribe a line around the upper mounting nuts to show the original adjustment.



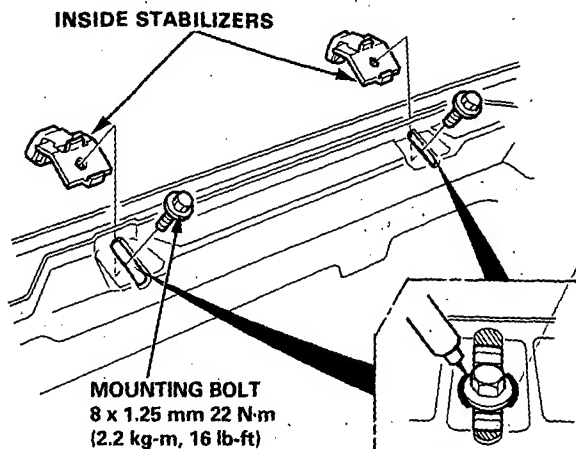
20. Start lower weatherstrip retaining screw clips, take off the lower weatherstrip and retaining screw.

21. Start the molding up, detach the outer molding.



21. Remove the mounting bolts, then remove the inside stabilizers from the door panel.

NOTE: Scribe a line around the mounting bolts to show the original adjustment.



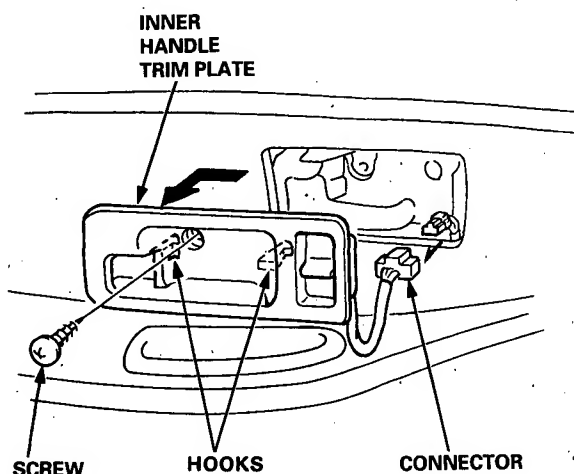


## Disassembly

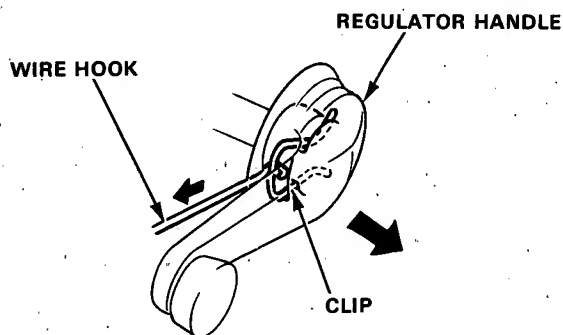
### Sedan front:

1. Remove the screw, then carefully remove the inner handle trim plate. Disconnect the power door lock connector.

NOTE: Take care not to scratch the inner handle trim plate.



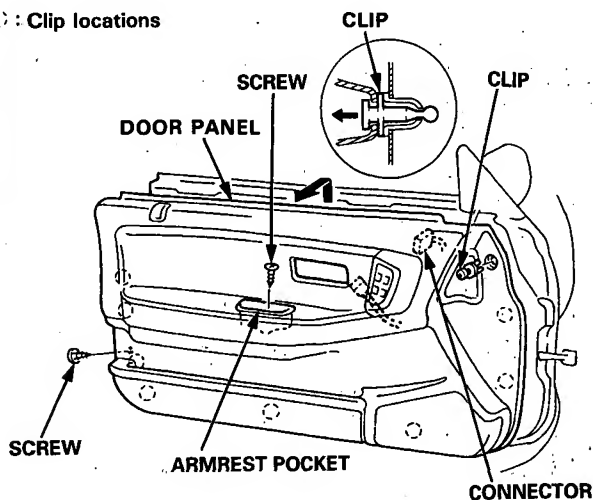
2. If applicable, remove the regulator handle by pulling the clip out with a wire hook.



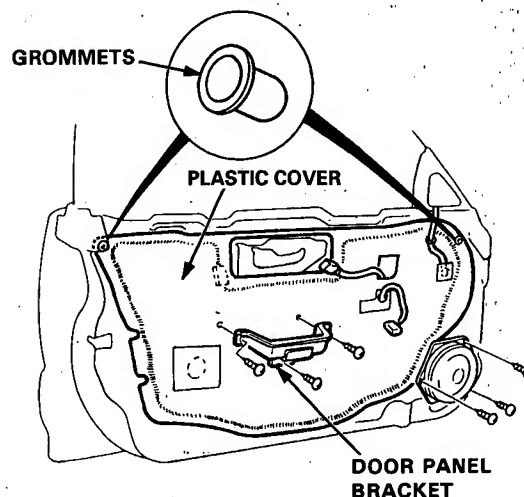
NOTE: If necessary, see door speaker replacement (see page 20-5).

3. Remove the screw and carefully pry up the armrest pocket. Remove the screws and clips (see trim pad remover, page 20-5) attaching the door panel. Remove the door panel by pulling it upward and disconnect the power window connector.

### Clip locations



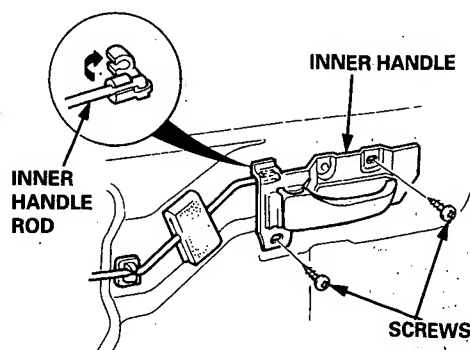
4. Carefully remove the plastic cover.



5. Remove the screws, disconnect the inner handle rod, then remove the inner handle.

### NOTE:

- When installing, make sure the inner handle rod is fastened correctly.
- Take care not to bend the inner handle rod.



(cont'd)

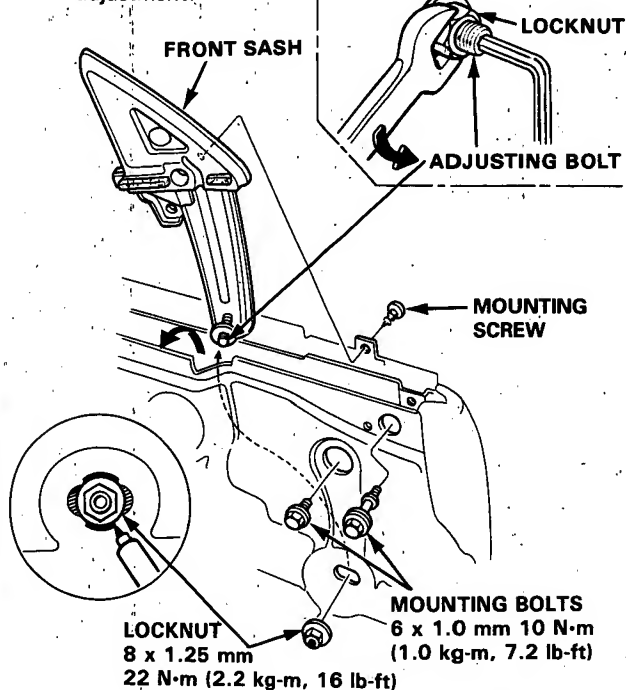
# Doors

## Disassembly (cont'd)

6. Remove the door mirror (see pages 20-27, 28).
7. Lower the glass and remove the mounting bolts, mounting screw and locknut, then remove the front sash.

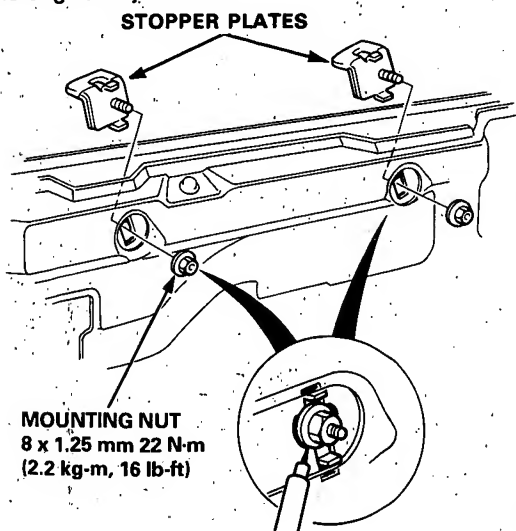
### NOTE:

- Hold the adjusting bolt with a hex wrench when removing the locknut.
- Scribe a line around the locknut to show the original adjustment.



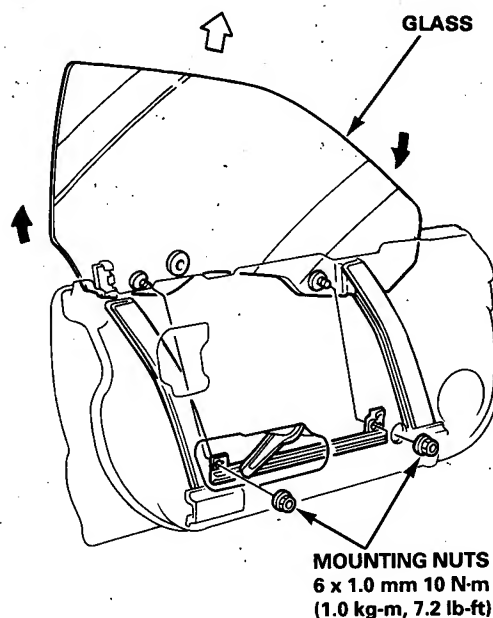
8. Remove the mounting nuts, then remove the stopper plates.

NOTE: Scribe a line around the mounting nuts to show the original adjustment.

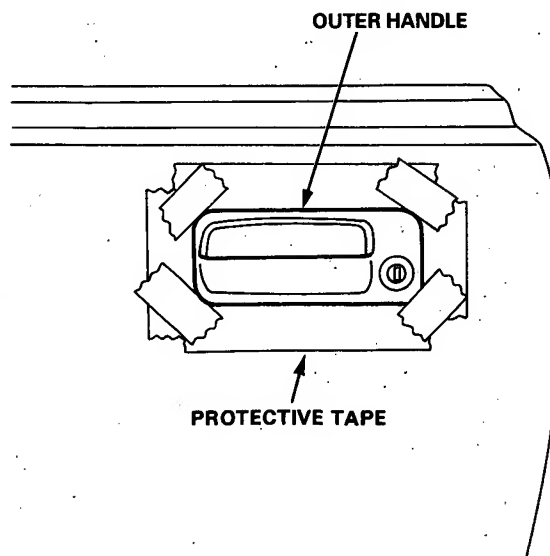


9. Reconnect the power window switch to operate the regulator.
10. Carefully lower the glass until you can see its mounting nuts, then remove the nuts. Pull the glass out through the window slot.

NOTE: Take care not to drop the glass inside the door.



11. Use protective tape around the edge of the outer handle to prevent scratching the paint.



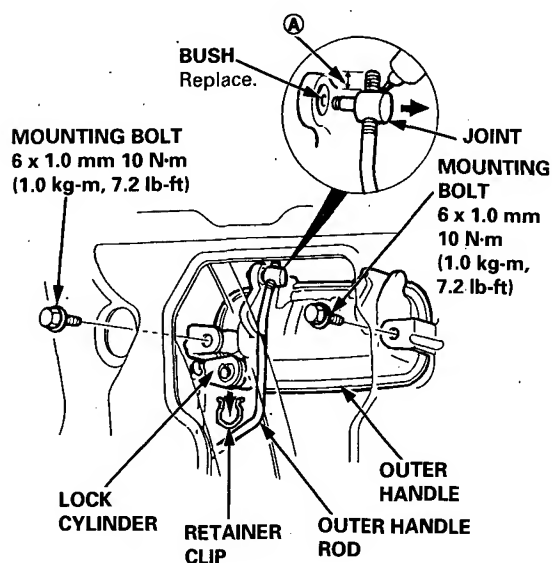


12. Pull out the retainer clip, then remove the lock cylinder.
13. Remove the mounting bolts. Pull the outer handle out, then pry the outer handle rod out of its joint using a flat tip screwdriver.

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

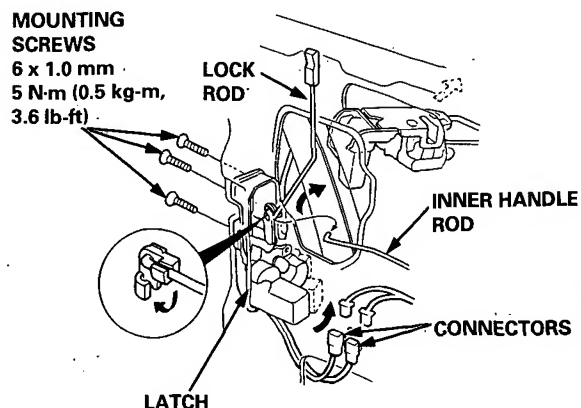
**NOTE:**

- To ease reassembly, note the location **A** of the outer handle rod on the joint before disconnecting it.
- Take care not to damage the joint and outer handle.



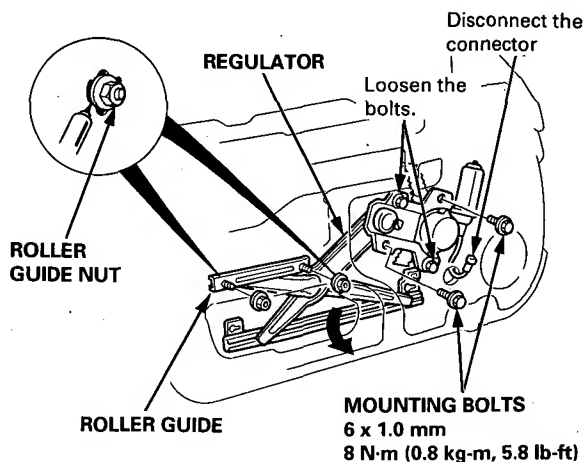
14. Disconnect the inner handle rod. Remove the mounting screws and take the latch off the door, then push the latch and lock rod out of the door. Disconnect the connectors.

**NOTE:** Take care not to bend the lock rod.



15. Remove the roller guide bolts. Remove and loosen the mounting bolts, then remove the regulator through the center hole in the door.

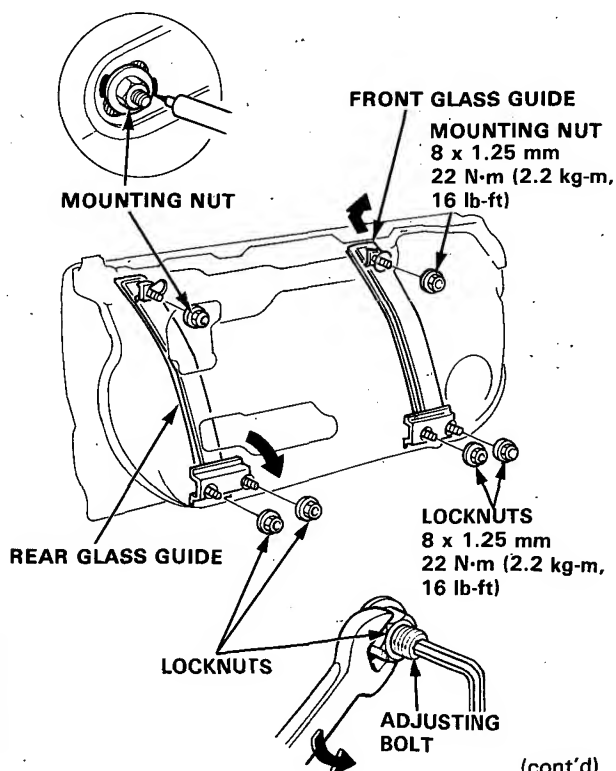
**NOTE:** Scribe a line around the roller guide nuts to show the original adjustment.



16. Remove the mounting nuts and locknuts, then remove the front and rear glass guides.

**NOTE:**

- Hold the adjusting bolts with a hex wrench when removing the locknuts.
- Scribe a line around the upper mounting nuts to show the original adjustment.



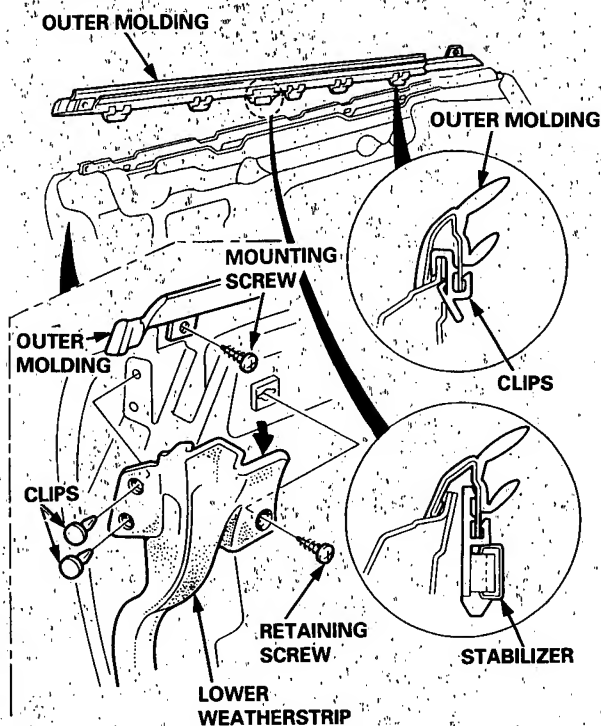
(cont'd)

# Doors

## Disassembly (cont'd)

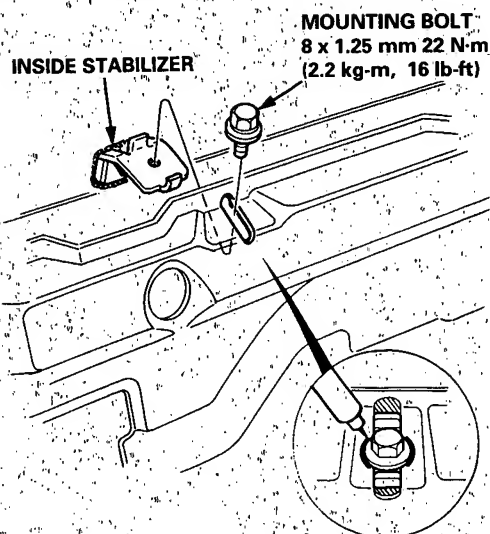
17. First remove the lower weatherstrip retaining screw and clips, then pull-off the lower weatherstrip.
18. Remove the outer molding mounting screw.
19. Starting at the rear, pry the outer molding up and detach the clips, then remove the outer molding.

NOTE: Take care not to twist or scratch the outer molding.



20. Remove the mounting bolt, then remove the inside stabilizer from the door panel.

NOTE: Scribe a line around the mounting bolt to show the original adjustment.

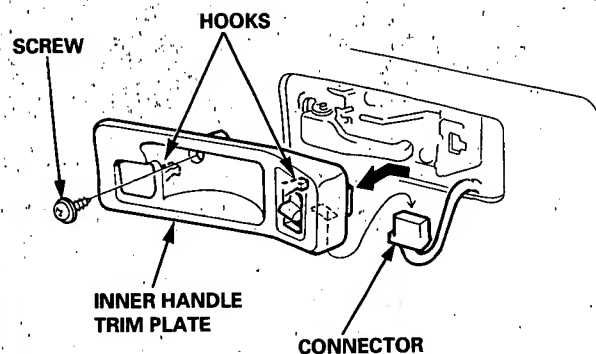


## Disassembly

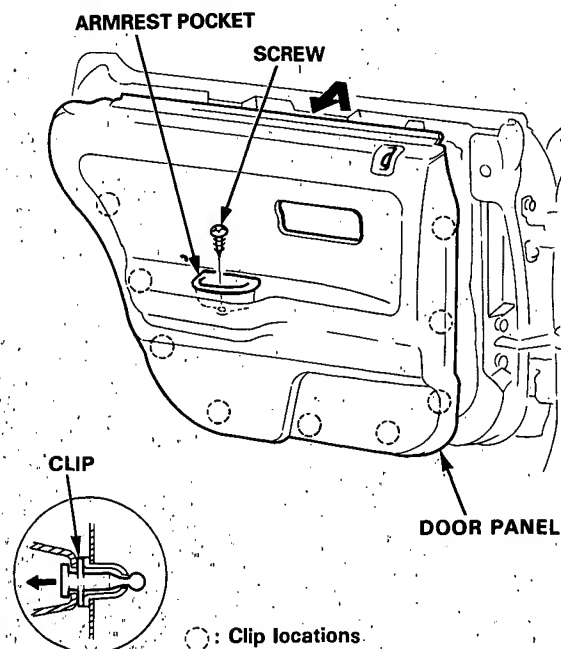
### Sedan Rear:

1. Remove the screw, carefully remove the inner handle trim plate, then disconnect the power window connector.

NOTE: Take care not to scratch the inner handle trim plate.



2. If applicable, remove the regulator handle by pulling the clip out with a wire hook (see page 20-10).
3. Remove the screw and carefully pry up the armrest pocket. Remove the clips (see trim pad remover, page 20-10) attaching the door panel.

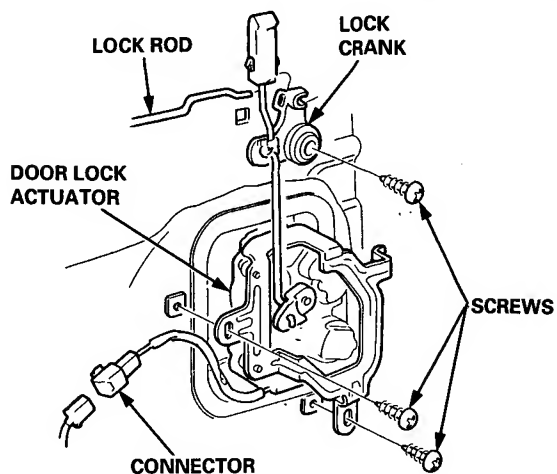




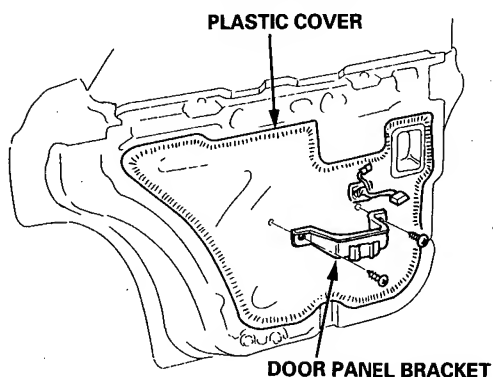


4. Remove the screws attaching the door lock actuator and lock crank. Disconnect the connector and lock rod, then remove the door lock actuator and lock crank.

NOTE: Take care not to bend the lock rods.



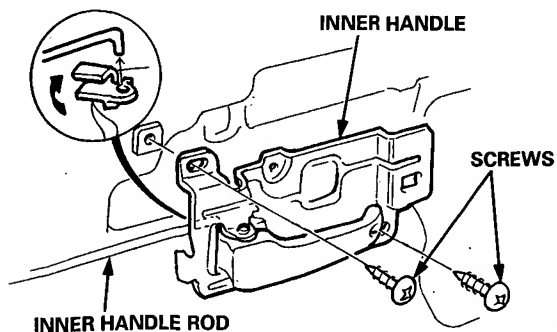
5. Carefully remove the plastic cover.



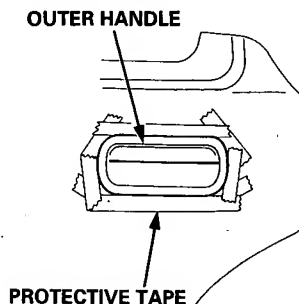
6. Remove the screws, disconnect the inner handle rod, then remove the inner handle.

NOTE:

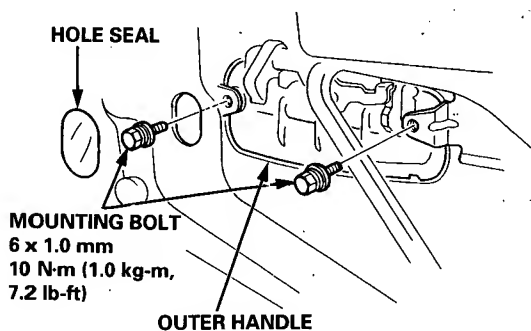
- When installing, make sure the inner handle rod is fastened correctly.
- Take care not to bend the inner handle rod.



7. Use protective tape around the edge of the outer handle to prevent scratching the paint.



8. Reconnect the window switch to operate the regulator.
9. Raise the glass fully.
10. Remove the outer handle mounting bolts.

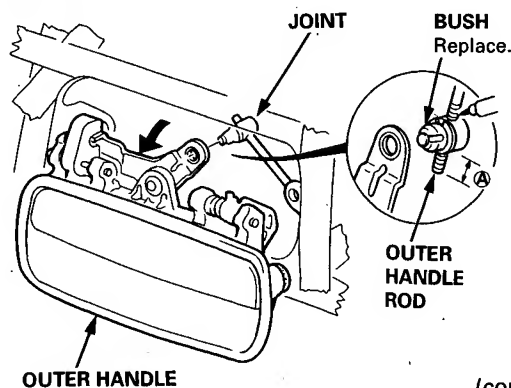


11. Pull the outer handle out, then pry the outer handle rod out of its joint using a flat tip screwdriver.

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

NOTE:

- To ease reassembly, note the location (A) of the outer handle rod on the joint before disconnecting it.
- Take care not to damage the joint and outer handle rod.

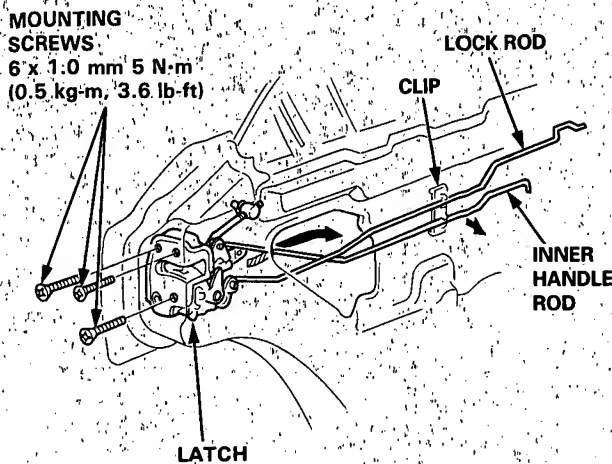


(cont'd)

# Doors

## Disassembly (cont'd)

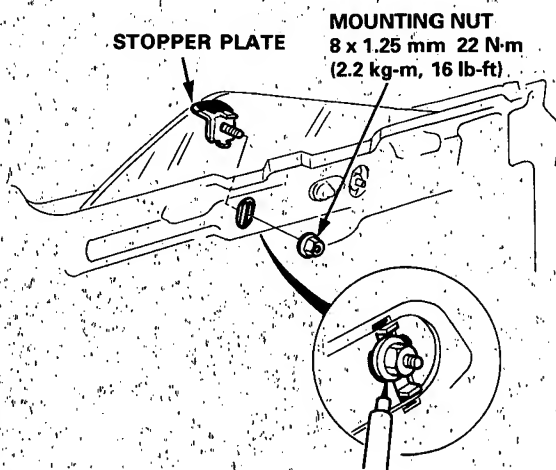
12. Remove the mounting screws, then remove the latch from the hole in the door.



NOTE: Take care not to bend the lock rod and inner handle rod.

13. Lower the glass and remove the mounting nut, then remove the stopper plate.

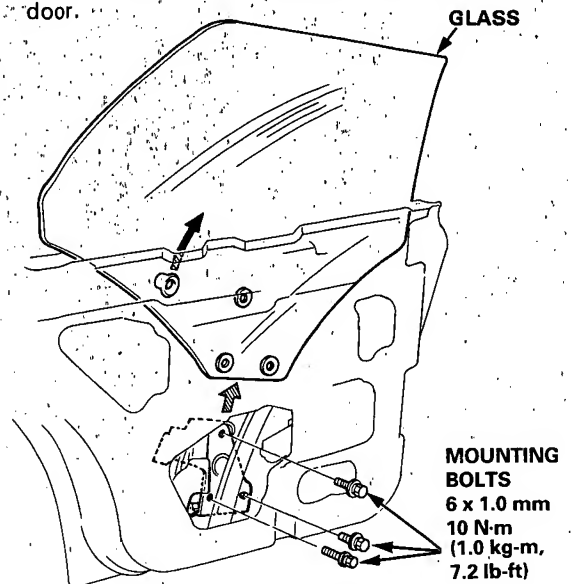
NOTE: Scribe a line around the mounting nut to show the original adjustment.



14. Carefully lower the glass until you can see its mounting bolts.

15. Remove the mounting bolts and pull the glass out through the window slot.

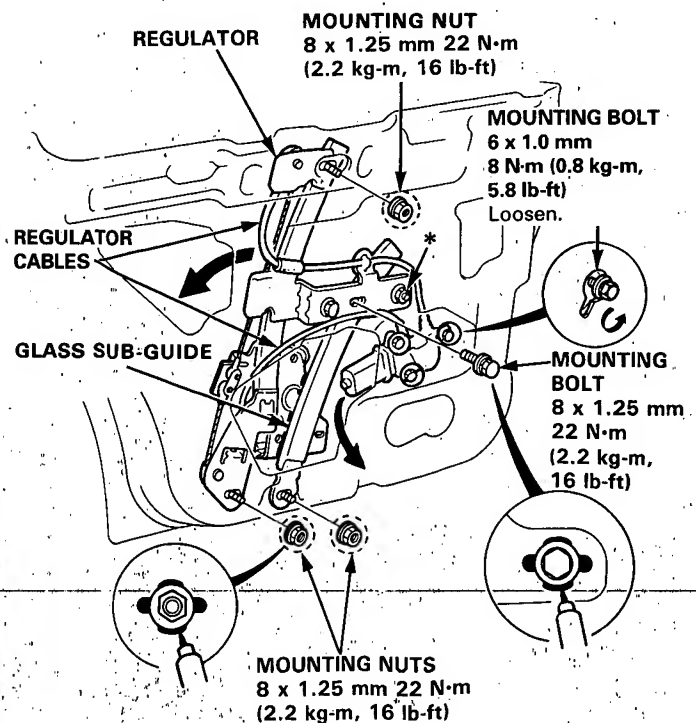
NOTE: Take care not to drop the glass inside the door.



16. Remove the three mounting nuts and mounting bolt and loosen the three mounting bolts, then remove the regulator through the hole in the door.

NOTE:

- Scribe a line around the mounting nuts and bolt to show the original adjustment.
- \*: Do not remove the glass sub-guide locknuts.
- When installing the regulator, make sure the regulator cables are not pinched.

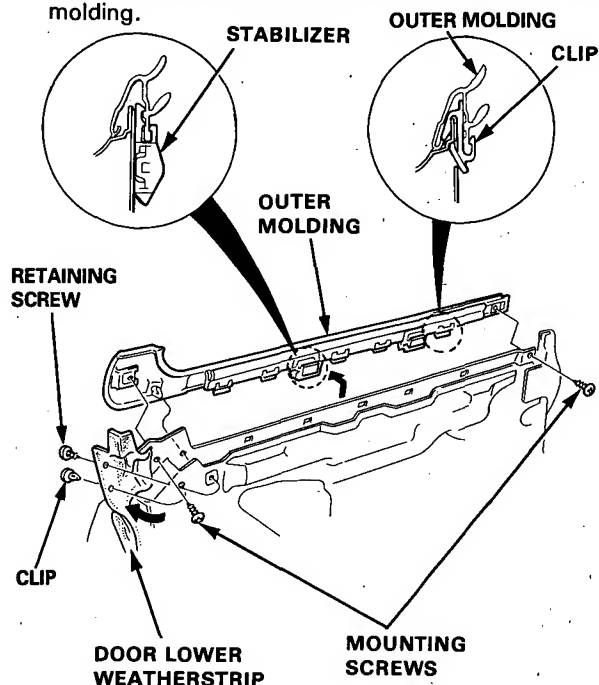




## Assembly

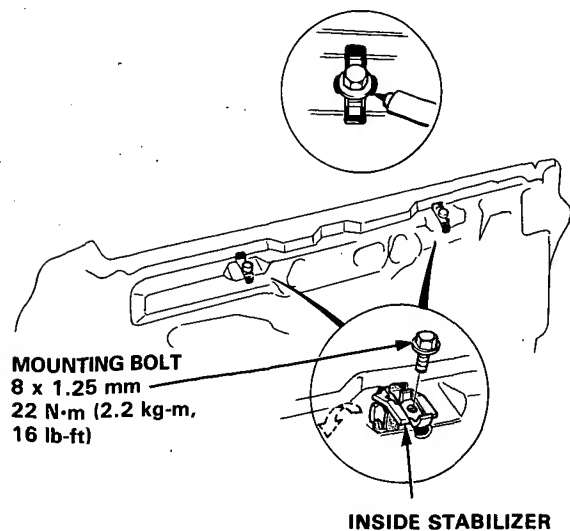
17. First remove the lower weatherstrip retaining screw and clip, then turn over the lower weatherstrip.
18. Remove the mounting screws, then starting at the rear, pry the outer molding up. Detach the clips, then remove the outer molding.

NOTE: Take care not to twist or scratch the outer molding.



19. Remove the mounting bolts, then remove the inside stabilizers from the door panel.

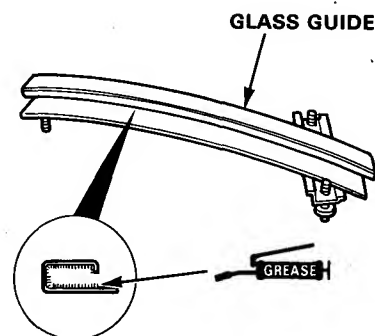
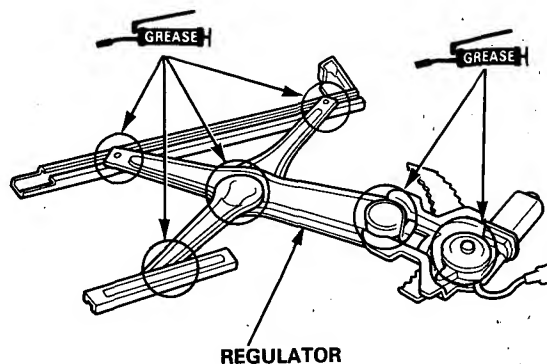
NOTE: Scribe a line around the mounting bolts to show the original adjustment.



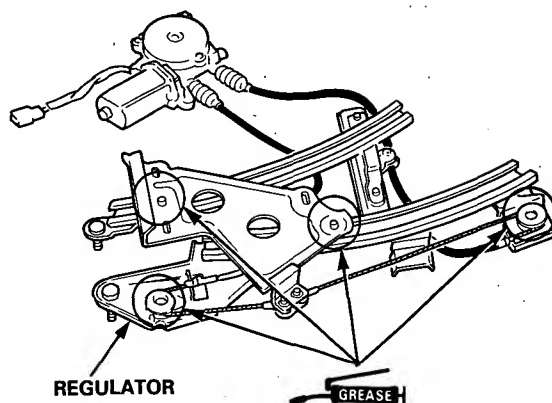
Assemble the door in the reverse order of disassembly, and also:

1. Grease all the sliding surfaces of the regulator where shown.

Hatchback, Sedan Front:



Sedan rear:



2. Roll the glass up and down to see if it moves freely without binding. Also make sure that there is no clearance between the glass and weatherstrip (body side) when the glass is closed. Adjust the position of the glass as necessary (see page 20-17).

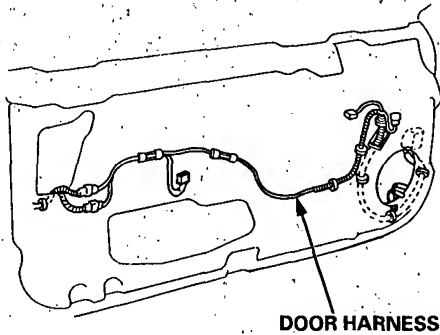
(cont'd)

# Doors

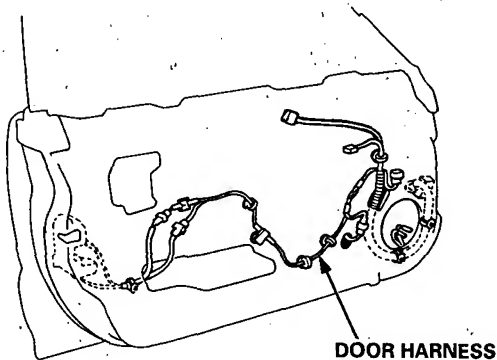
## Assembly (cont'd)

3. Install the door harness correctly on the door.

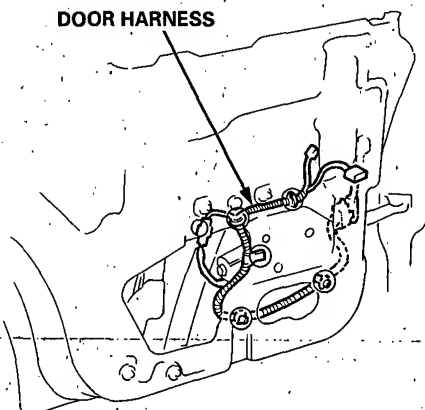
Hatchback:



Sedan Front:

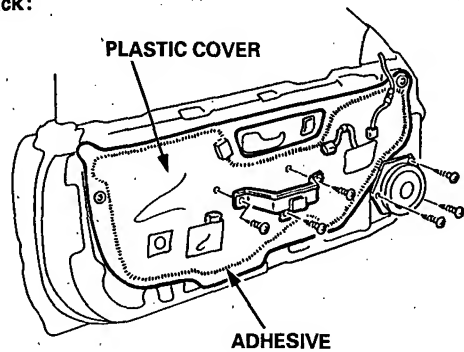


Rear:

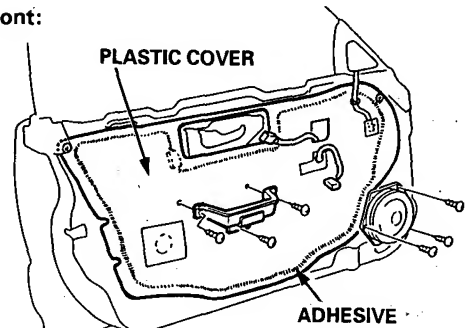


4. When reinstalling the plastic cover, apply adhesive along the edge where necessary to maintain a continuous seal and prevent water leaks.

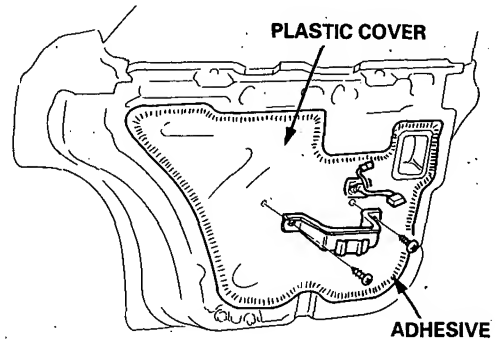
Hatchback:



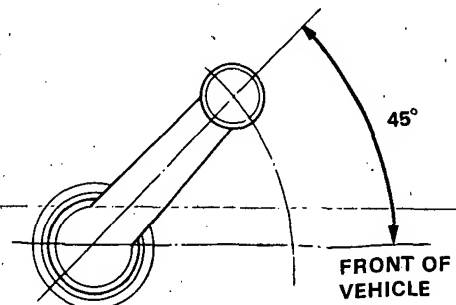
Sedan Front:



Rear:



5. Install the regulator handle so it points forward and up at a 45 degree angle with the glass closed.

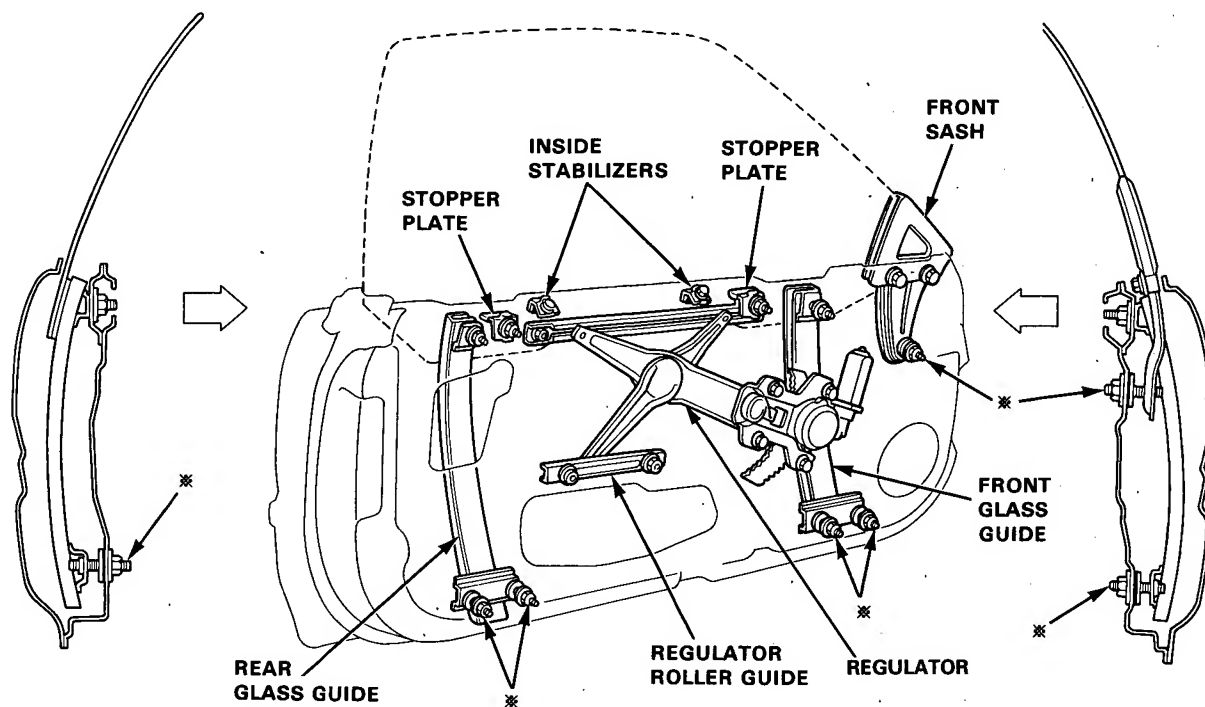




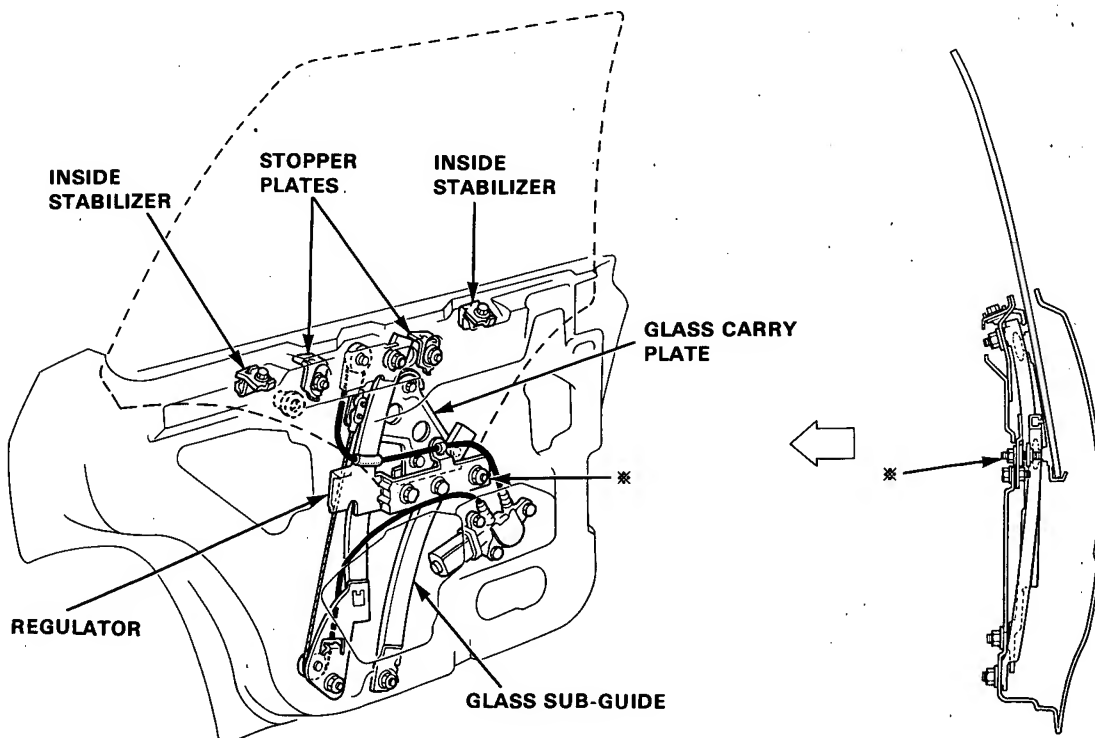
## Glass Adjustment

※ : Adjusting bolt locations

Hatchback/Sedan Front:



Sedan Rear:



(cont'd)

# Doors

## Glass Adjustment (cont'd)

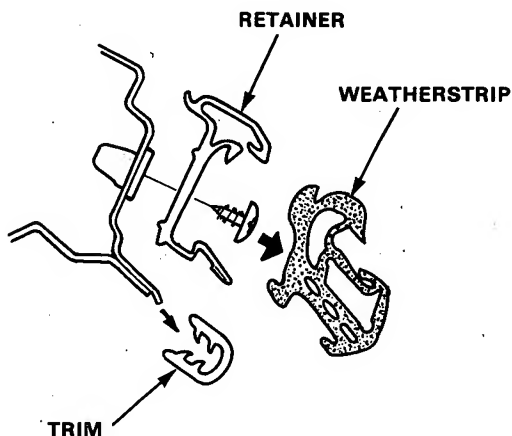
**NOTE:** Place the vehicle on a firm, level surface when adjusting the glass fit.

1. Remove the door trim (see pages 20-61, 62).
2. Remove the weatherstrip (see page 20-86).

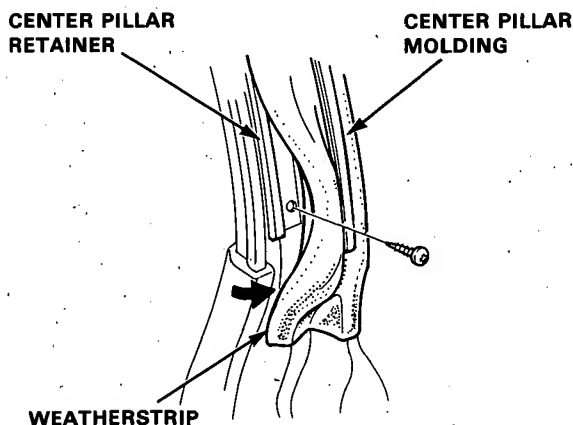
**NOTE:**

- On the Sedan, pry the weatherstrip up at the center pillar, remove the four screws, then remove the weatherstrip with the center pillar retainer.
- Check the weatherstrip for damage or deterioration and replace if necessary.

3. Remove all retainers by removing the attaching screws.



**Sedan:**

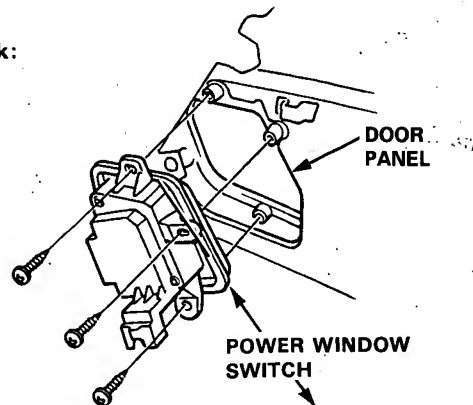


4. Remove the door panel and peel off the plastic cover. (see pages 20-5, 9, 12).
5. Remove the door mirror (see pages 20-27, 28).
6. Install the regulator handle on the regulator.

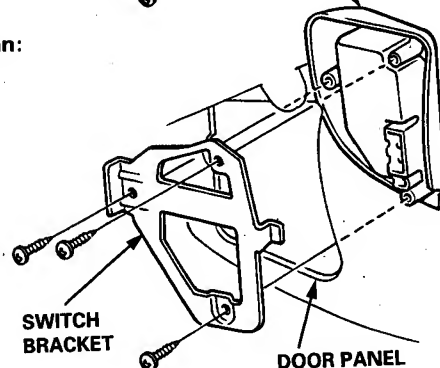
**(Power Window Model)**

7. Remove the power window switch from the door panel.

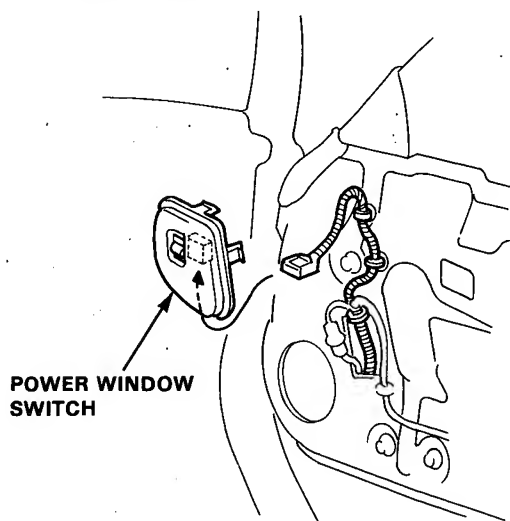
**Hatchback:**



**Sedan:**



8. Connect the power window switch to the door harness connector.



9. Carefully close the door while holding the glass to prevent it from contacting the body panel.
10. Raise the glass fully.

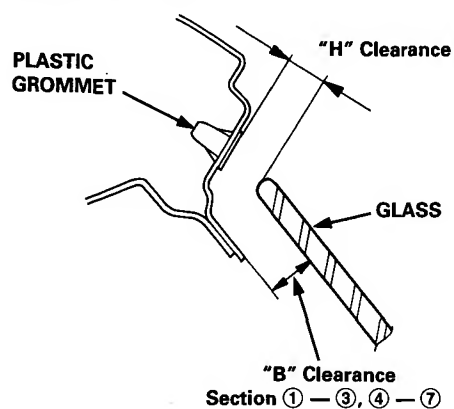
**NOTE:** Check the door fit to the body opening.



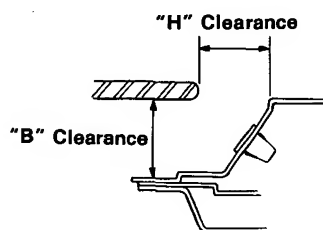
11. Measure and record the clearance "H" and "B" between the glass and body at the locations shown.

12. Adjust the clearance as described in the steps (13) thru (16).

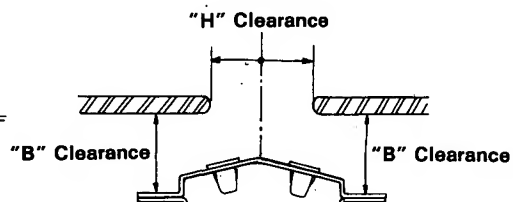
### Measuring Points



### Hatchback:

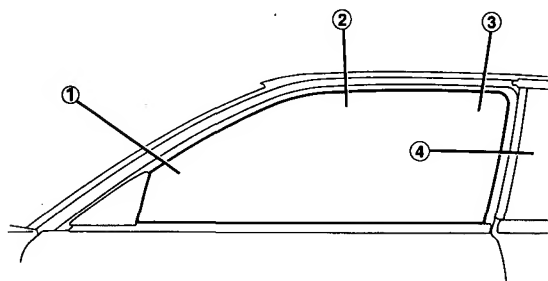


### Sedan:



### Section ④

### Hatchback: (13) and (14)



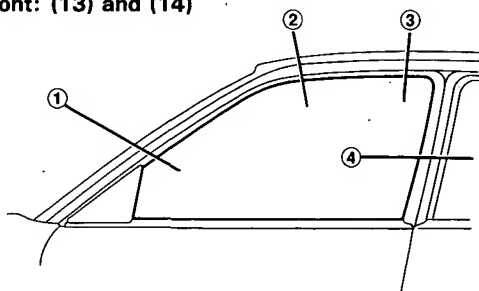
### Standard Clearance

- Permissible tolerance:  $\pm 1.0$  mm (0.04 in)

Unit: mm (in)

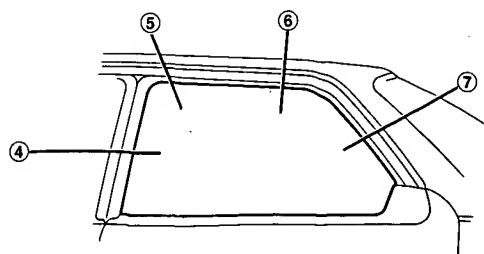
Measuring Point	①	②	③	④
Clearance	H	12.5 (0.49)	10.5 (0.41)	20.5 (0.81)
	B	15.5 (0.61)	10.0 (0.39)	19.0 (0.74)

### Sedan Front: (13) and (14)



Measuring Point	①	②	③	④
Clearance	H	12.5 (0.49)	10.5 (0.41)	15.0 (0.59)
	B	15.5 (0.61)	10.0 (0.39)	15.5 (0.61)

### Sedan Rear: (15) and (16)



Measuring Point	④	⑤	⑥	⑦
Clearance	H	15.0 (0.59)	10.5 (0.41)	13.0 (0.51)
	B	15.5 (0.61)	10.0 (0.39)	16.0 (0.63)

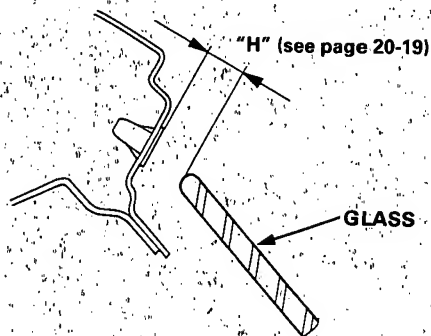
(cont'd)

# Doors

## Glass Adjustment (cont'd)

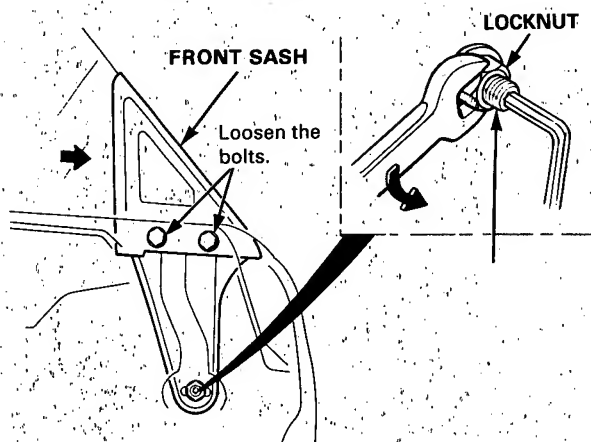
### Hatchback/Sedan Front:

13. Adjust Clearance "H" as follows.



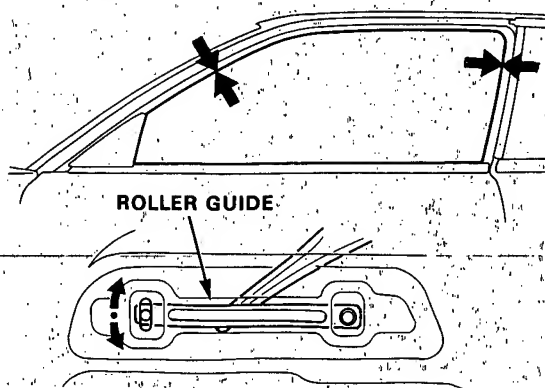
- 1 Loosen the two bolts and lock nut securing the front sash and move the front sash all the way forward.

NOTE: Hold the adjusting bolt with a hex wrench when loosening the locknut.



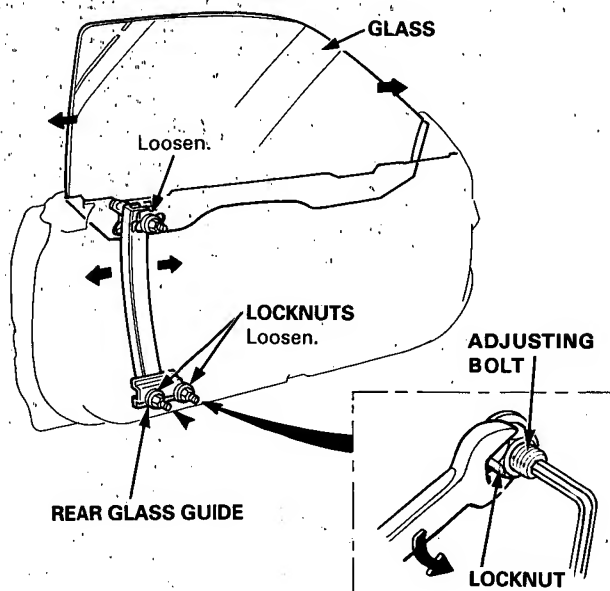
- 2 Loosen the roller guide nut securing the front and rear stopper plates.

- 3 Loosen the roller guide nut securing the roller guide. Move the guide up or down to align the glass with the body at the front and center pillars.



- 4 Loosen the nuts securing the rear glass guide and adjust the glass fore and aft by moving the rear glass guide.

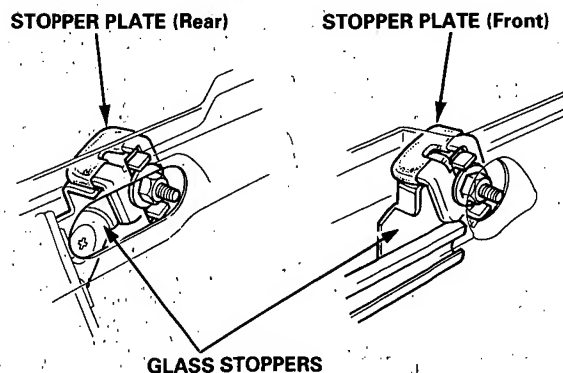
NOTE: Hold the adjusting bolts with a hex wrench when loosening the locknuts.



- 5 Repeat the steps -3 thru -4 until the clearance "H" is within the specified limits, then secure the rear glass guide and roller guide.

Press the stopper plates against the glass stoppers, then secure the stopper plates.

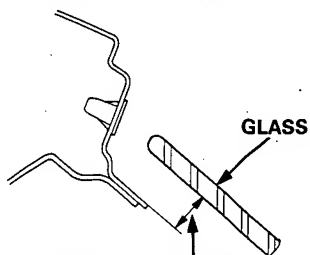
NOTE: Check that the stopper plates contact the glass stoppers evenly.







#### 14. Adjust clearance "B" as follows.

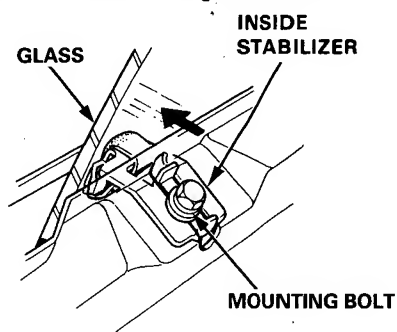


"B" (see page 20-19)

NOTE: Raise the glass fully.

- 1 Lower the glass 10 mm (0.39 in).
- 2 Push the glass outward 10 mm (0.39 in), then push the inside stabilizers against the glass lightly. Retighten the mounting bolts securely.

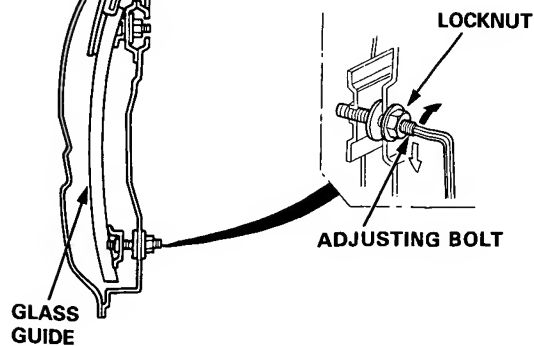
NOTE: Check that the glass moves smoothly.



- 3 Raise the glass fully.
- 4 Loosen the locknuts and turn the adjusting bolts until the clearance "B" is within the specified values.

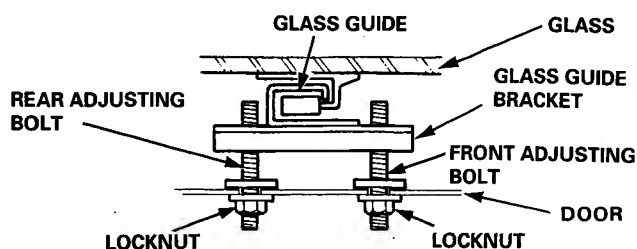


Adjusting Bolt	Top Edge of Glass
Clockwise	→ Moved out
Counter-clockwise	⇐ Moved in

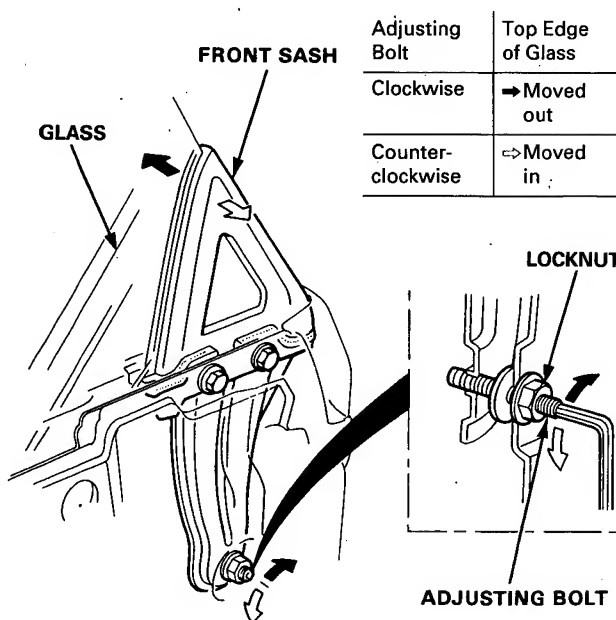


NOTE: Turn the front and rear adjusting bolts the same amount so as to keep the glass guide bracket parallel with the seating surface of the door.

After tightening the adjusting bolts, make sure that the ends of the adjusting bolts still project out of the locknuts.



- 5 Align the front sash holder with the adjusting bolt at the bottom of the holder.



Adjusting Bolt	Top Edge of Glass
Clockwise	→ Moved out
Counter-clockwise	⇐ Moved in

- 6 Move the glass up and down to seat it, then measure the clearance "B" at the designated locations (see page 20-19).

- 7 Again measure the clearance "H" to make sure it is still within the specified limits at the designated locations (see page 20-19).

NOTE: Repeat the above steps until the correct clearances are obtained.

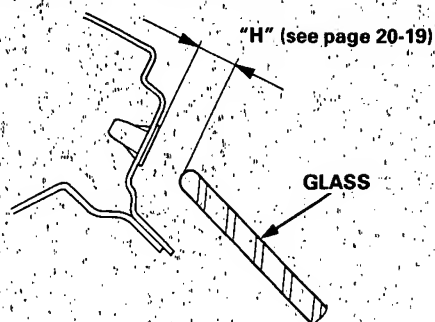
(cont'd)

# Doors

## Glass Adjustment (cont'd)

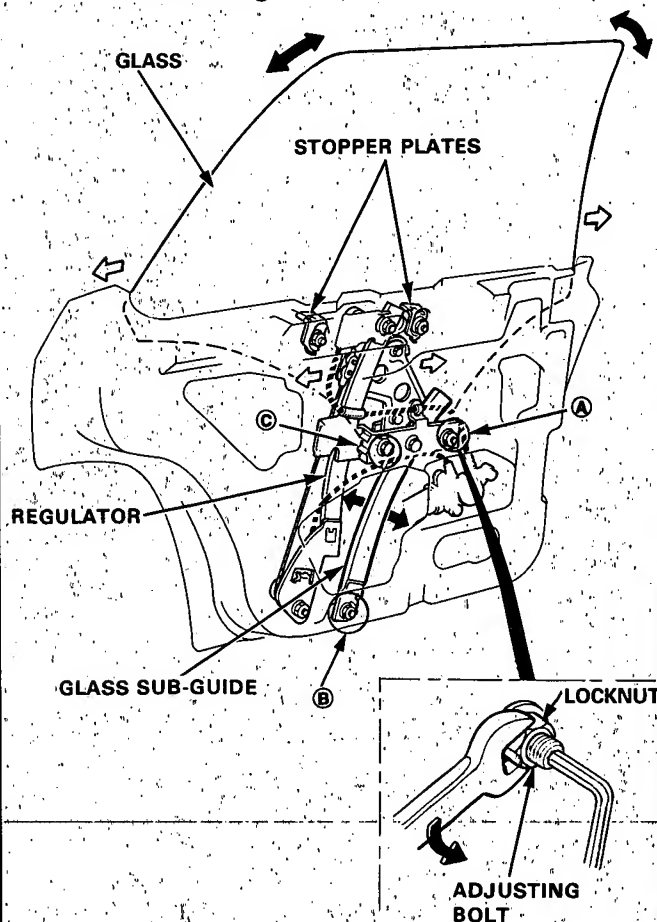
### Sedan Rear:

15. Adjust Clearance "H" as follows.



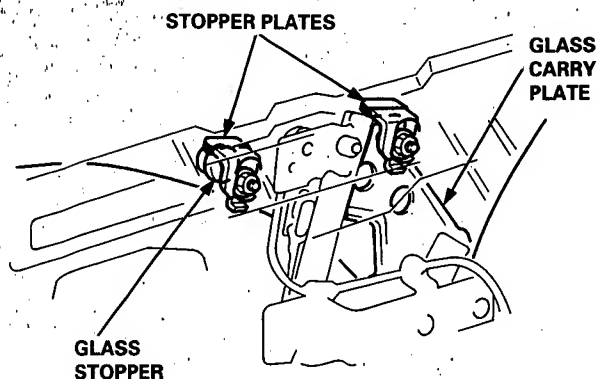
- 1 Loosen the nuts securing the stopper plate.
- 2 Loosen the bolts and nuts securing the regulator, and adjust the glass fore and aft.
- 3 Loosen the nuts (A), (B) and bolt (C) securing the glass sub-guide, then align the glass with the center pillar.

NOTE: Hold the adjusting bolts when loosening the locknuts (A).



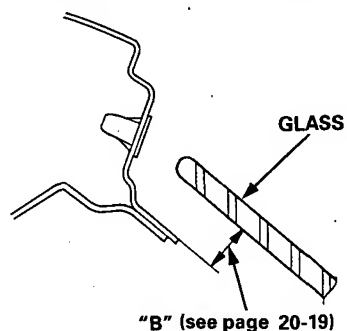
- 4 Repeat the steps -2 and -3 until the correct clearance "H" is obtained at the designated locations, then secure the regulator and glass sub-guide. Press the stopper plates against the glass stopper and glass carry plate, then secure the stopper plates.

NOTE: Check that the stopper plates contact the glass stopper and glass carry plate evenly.





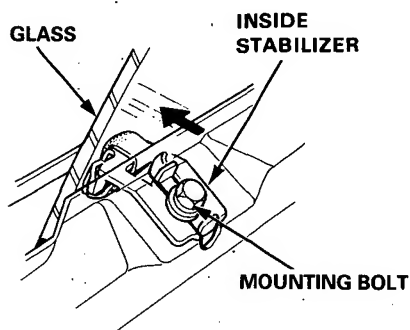
16. Adjust Clearance "B" as follows.



NOTE: Raise the glass fully.

- 1 Lower the glass 10 mm (0.39 in).
- 2 Push the glass outward 10 mm (0.39 in), then push the inside stabilizers against the glass lightly. Retighten the mounting bolts securely.

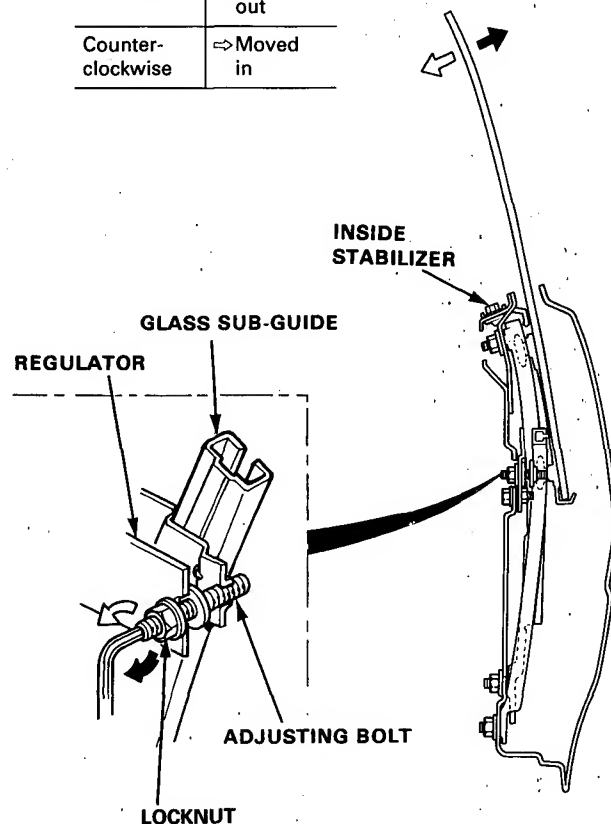
NOTE: Check that the glass moves smoothly.



- 3 Raise the glass fully.

- 4 Loosen the nut securing the glass sub-guide then turn the adjusting bolt in or out until the clearance "B" is within the specified limits at the designated locations.

Adjusting Bolt	Top Edge of Glass
Clockwise	→ Moved out
Counter-clockwise	⇐ Moved in



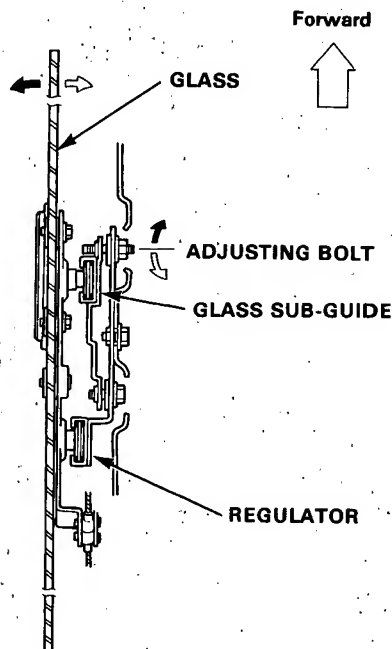
(cont'd)

# Doors

## Glass Adjustment (cont'd)

- 5 Check that clearance "B" is within the specified limits at the designated locations ⑤, ⑧ (see page 20-19).

Adjusting Bolt	Glass Top
Clockwise	→ Moved out
Counterclockwise	⇐ Moved in

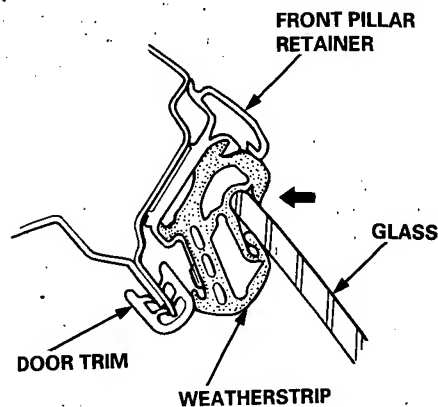


- 6 Move the glass up and down to seat it. Check that clearance "B" is within the specified limits at the designated locations (see page 20-19).

NOTE: Repeat the above steps until the correct clearance "B" is obtained.

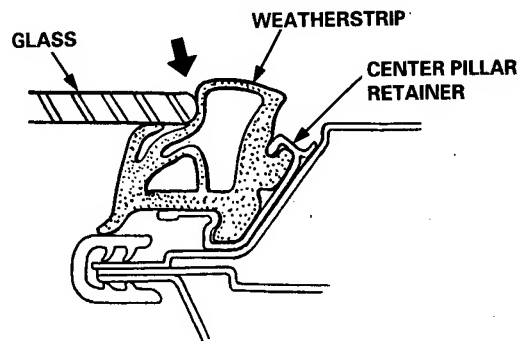
17. After the clearances have been adjusted properly, reinstall the front pillar and center pillar retainers and weatherstrip.  
18. Reinstall the door trim.  
19. Check that the glass contacts the weatherstrip evenly.

NOTE: Measuring points are described on page 20-19.

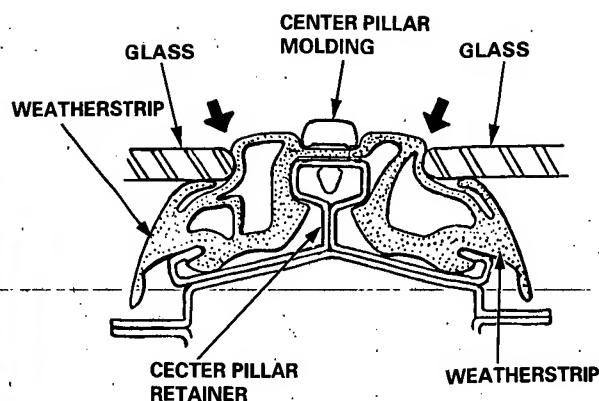


(Center Pillar Section)

Hatchback:



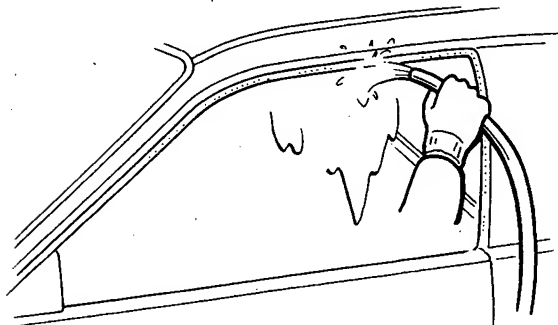
Sedan:





20. Check for water leaks.

NOTE: Do not use high pressure water.



21. Install the door harness.

22. Install the door mirror.

23. Attach the plastic cover, and install the door panel.

# Doors

## Position Adjustment

After installing the door, check for a flush fit with the body, then check for equal gaps between the front, rear, and bottom door edges and the body.

The door and body edges should also be parallel. Adjust at the door hinges as shown.

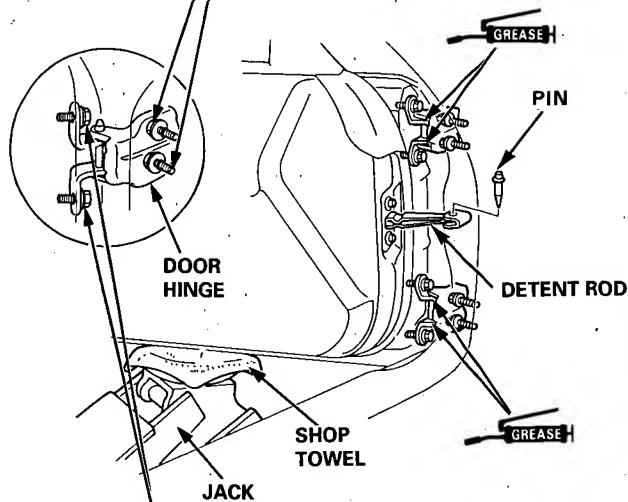
**CAUTION:** Place a shop towel on the jack to prevent damage to the door when loosening the door and hinge mounting bolts for adjustment.

### HINGE MOUNTING BOLTS

8 x 1.25 mm

30 N·m (3.0 kg-m, 22 lb-ft)

Loosen the hinge mounting bolts, and move the door BACKWARD or FORWARD, UP or DOWN as necessary to equalize the gaps.

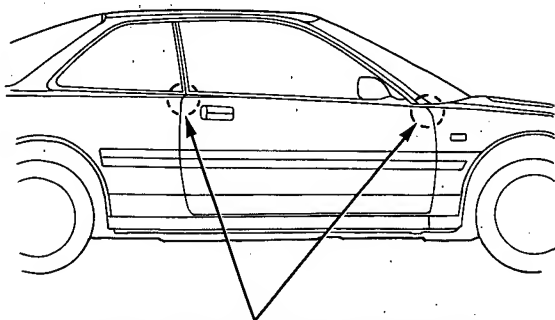


### DOOR MOUNTING BOLTS

8 x 1.25 mm

30 N·m (3.0 kg-m, 22 lb-ft)

Loosen the door mounting bolts slightly to move the door IN or OUT until it's flush with the body. If necessary, you can install a shim behind one hinge to make the door edges PARALLEL with the body.



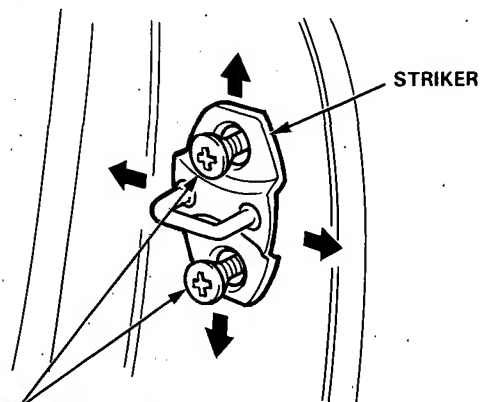
The door and body edges should be parallel.

NOTE: Check for water leaks.

## Striker Adjustment

Make sure door latches securely without slamming. If it needs adjustment:

1. Draw a line around the striker for reference.
2. Loosen the mounting screws and move the striker IN or OUT to make the latch fit tighter or looser. Move the striker UP or DOWN to align it with the latch opening. Then lightly tighten the mounting screws and recheck.



### MOUNTING SCREWS

8 x 1.25 mm

18 N·m (1.8 kg-m, 13 lb-ft)

NOTE: Hold the outer handle out and push the door against the body to be sure the striker allows a flush fit.

3. If the door latches properly, tighten the mounting screws and recheck.

# Power Door Mirror

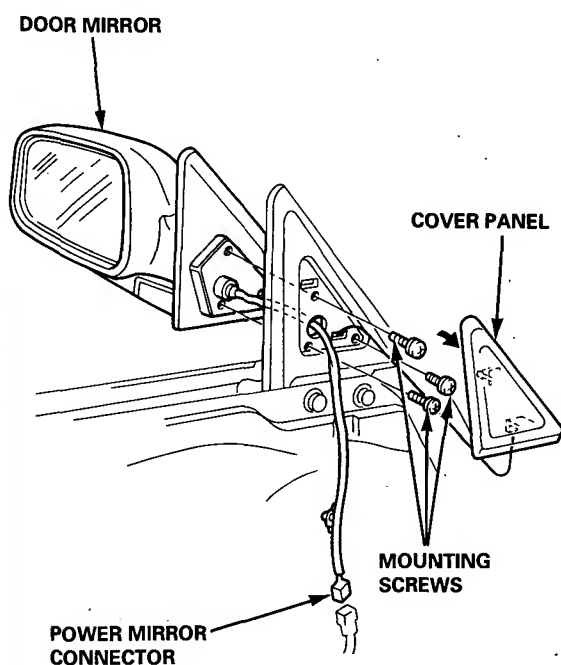


## Replacement

1. Remove the door panel and disconnect the power mirror connector.
2. Pry the cover panel out with a flat tip screwdriver, then remove it.

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

3. Remove the mounting screws while holding the door mirror.

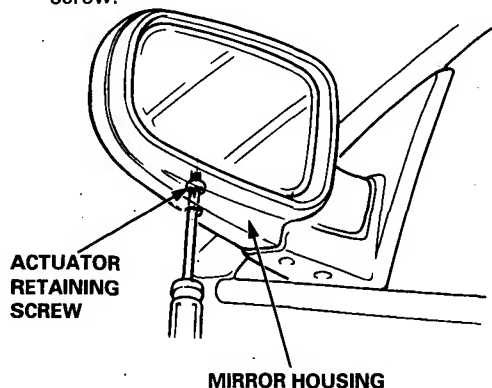


4. Installation is the reverse of the removal procedure.
5. Check for water leaks.

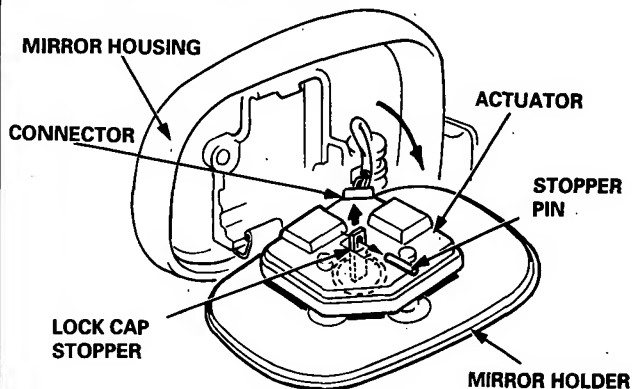
**NOTE:** Do not use high pressure water.

## Mirror Glass Replacement

1. Insert a screwdriver in the mirror housing through the service hole, then loosen the actuator retaining screw.



2. Pull the mirror holder out from the mirror housing.
3. Pull the lock cap stopper and remove the stopper pin, then separate the actuator and mirror holder. Disconnect the connector.



4. Installation is the reverse of the removal procedure.

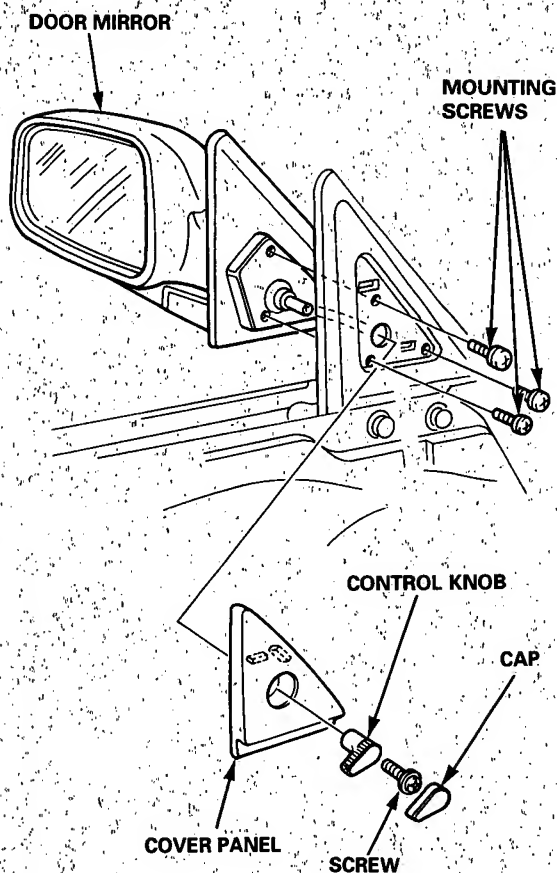
# Manual Door Mirror

## Replacement

1. Remove the cap and screw, then remove the control knob.
2. Pry the cover panel out with a flat tip screwdriver, then remove it.

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

3. Remove the mounting screws while holding the door mirror.

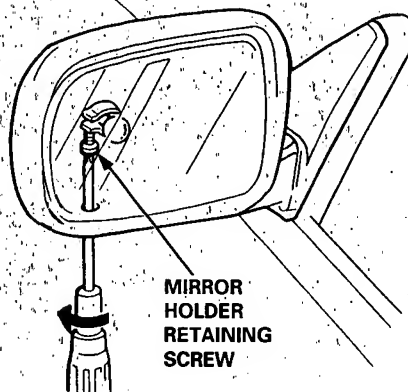


4. Installation is the reverse of the removal procedure.
5. Check for water leaks.

**NOTE:** Do not use high pressure water.

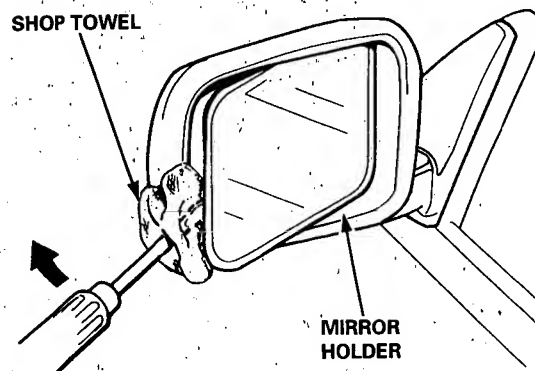
## Mirror Glass Replacement

1. Insert a screwdriver in the mirror holder through the service hole and loosen the mirror holder retaining screw.



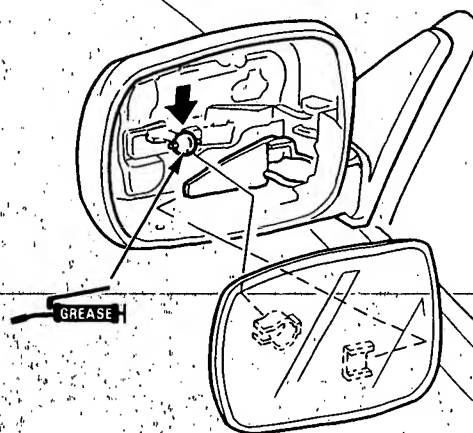
2. Carefully pry out the mirror holder with a flat tip screwdriver as shown.

**CAUTION:** To prevent damage to the mirror, wrap the end of a flat tip screwdriver with a shop towel.



3. Installation is the reverse of the removal procedure.

**NOTE:** Apply grease to the location indicated by the arrow.





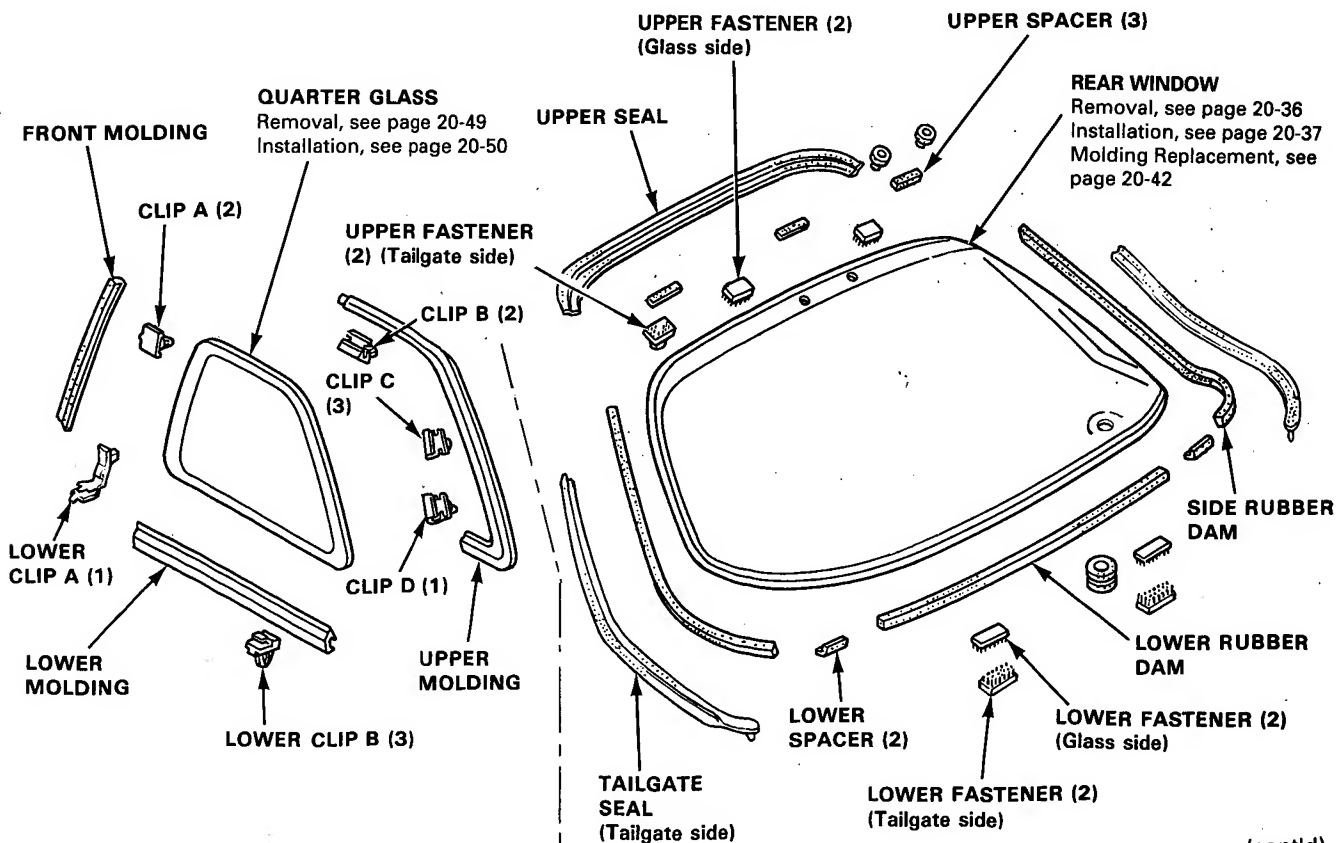
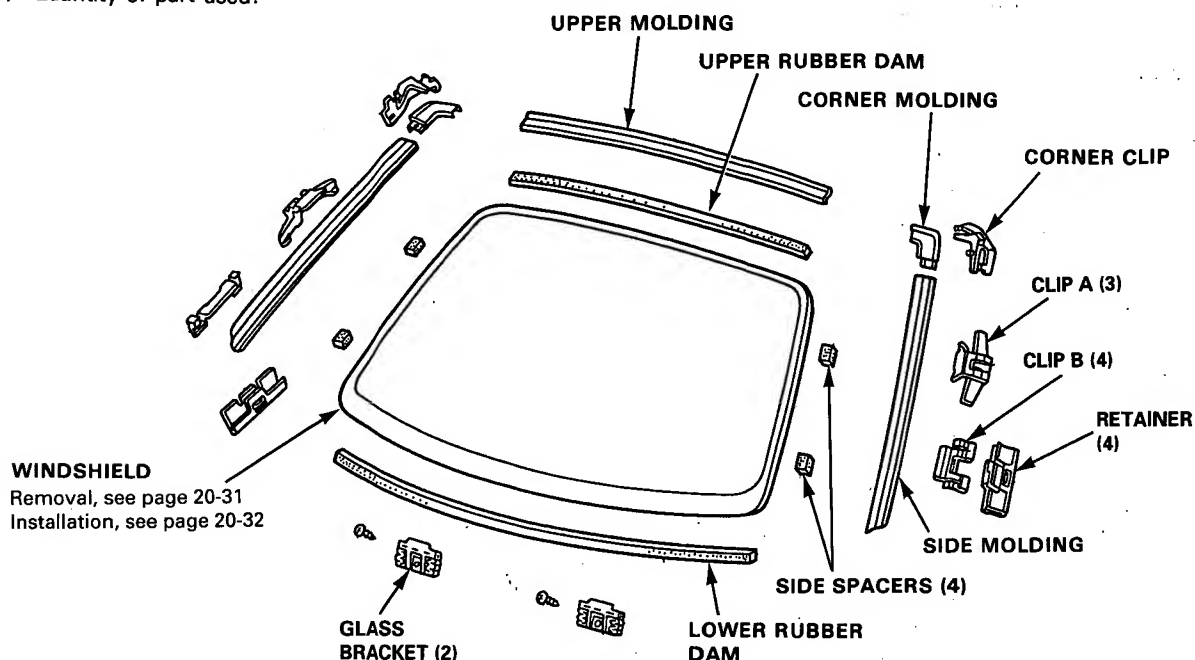


# Windshield, Rear Window, Quarter Glass

## Index

Hatchback:

( ): Quantity of part used.



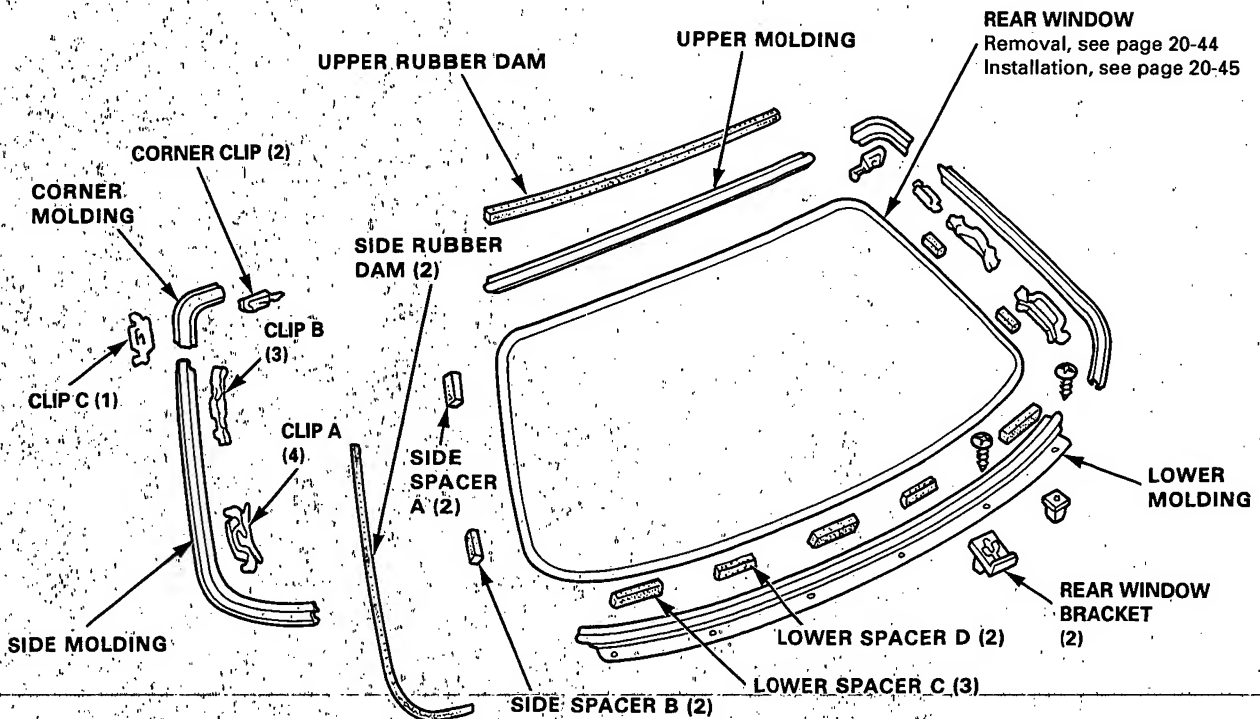
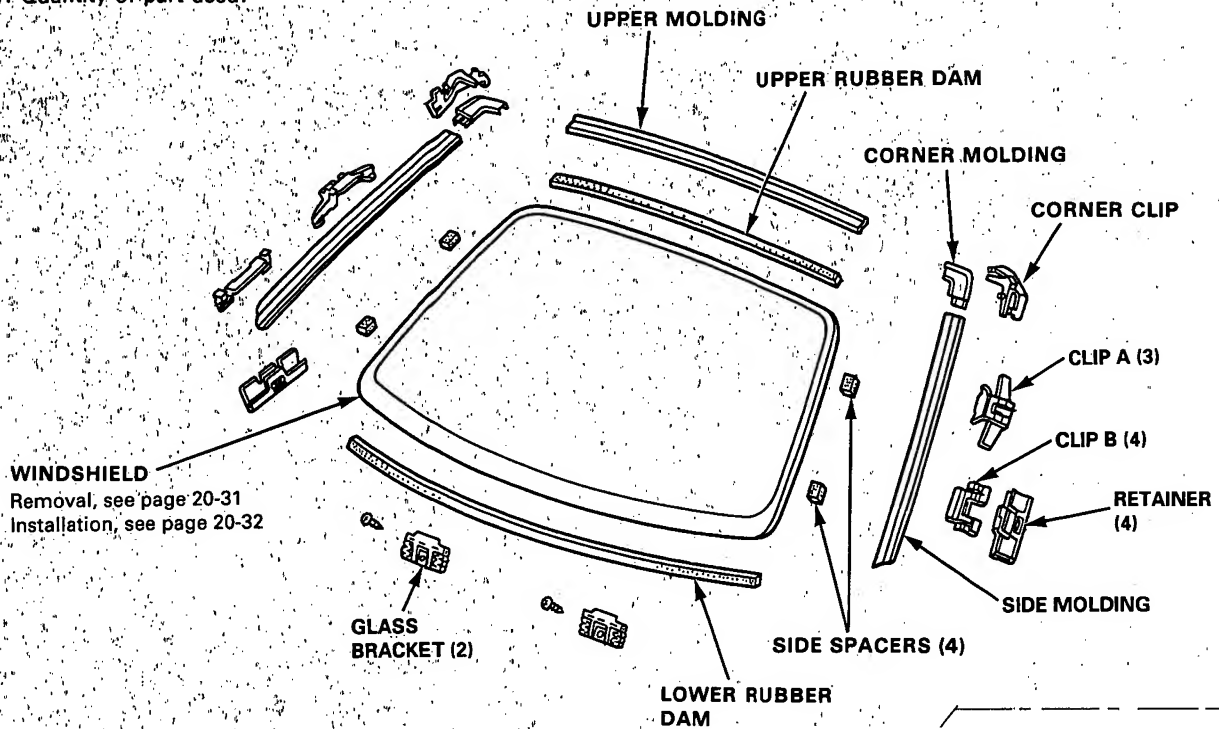
(cont'd)

# Windshield, Rear Window

## Index (cont'd)

Sedan:

( ) : Quantity of part used.



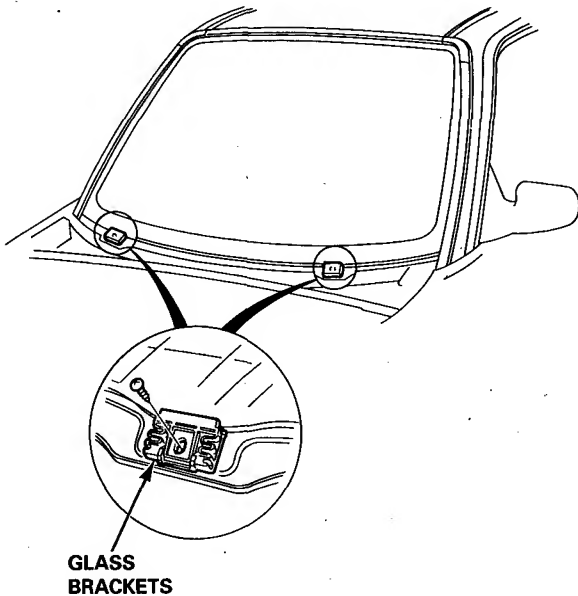
# Windshield



## Removal

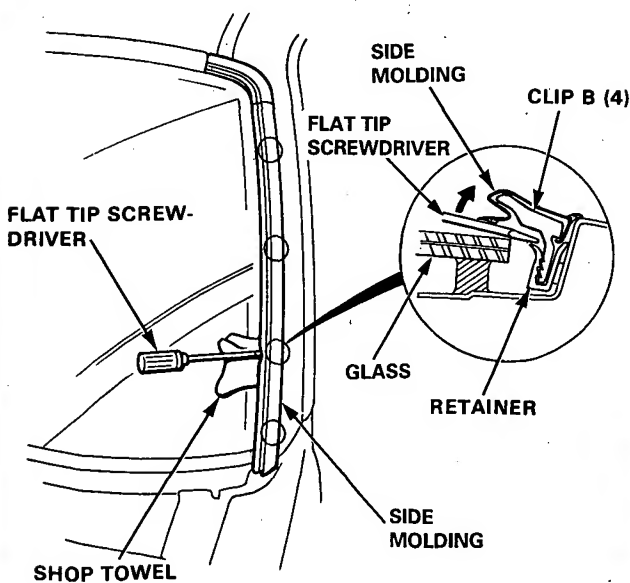
**CAUTION:** Wear gloves to remove and install the windshield.

- To remove the windshield, first remove the:
  - Rearview mirror (see page 20-72)
  - Sunvisors (see page 20-63)
  - Front pillar trim (see pages 20-61, 62)
  - Front wiper and air scoop (see section 23)
- Remove the right and left glass brackets.



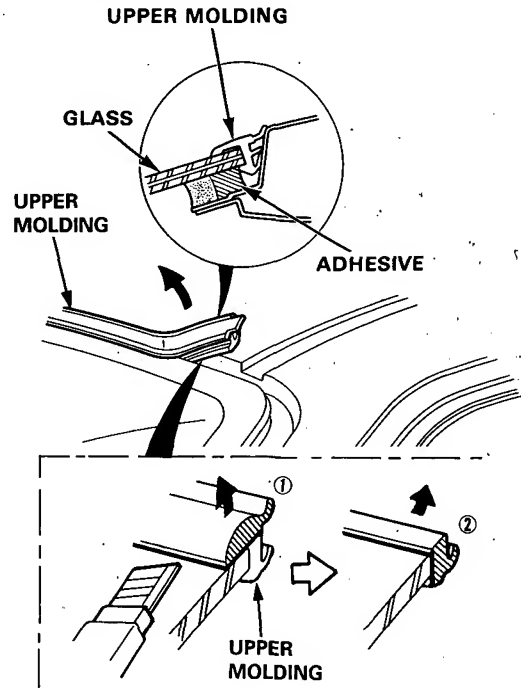
- Remove the side molding as shown.

**NOTE:** Take care not to damage the side molding and windshield.



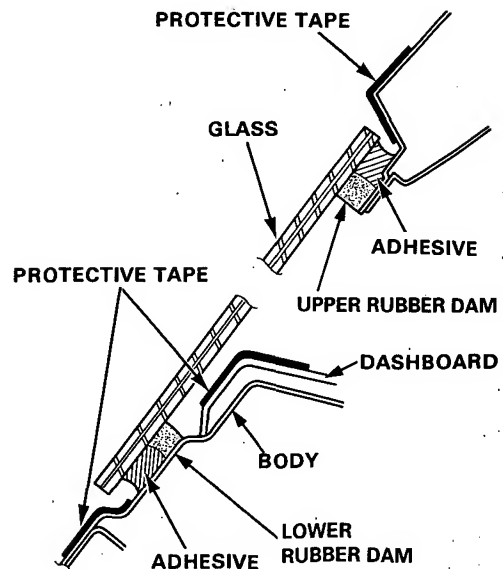
- Peel off the upper molding, then pull down the front edge of the headliner so it will not interfere with the windshield removal (see page 20-63).

**NOTE:** When the upper molding removal is difficult, cut the upper rubber portion ① off, then cut the side rubber portion ②.



- Apply protective tape to along the edge of the dashboard and body as shown.

**NOTE:** Take care not to bend the headliner excessively.

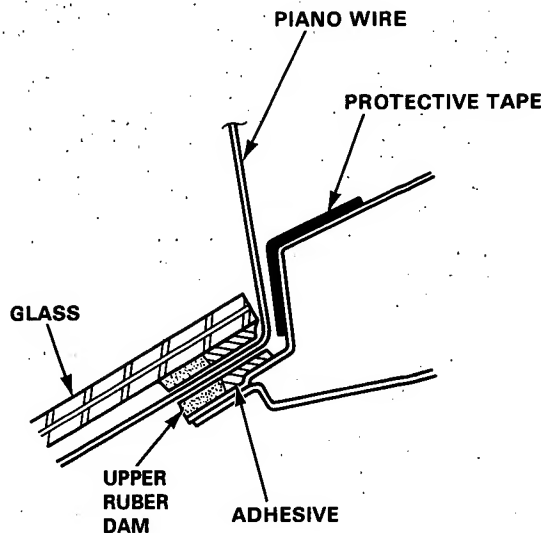


(cont'd)

# Windshield

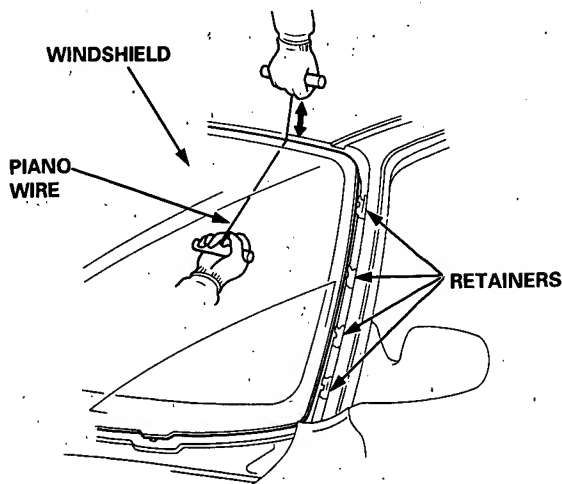
## Removal (cont'd)

- Using an awl, make a hole through the rubber dam and adhesive from inside the car. Push piano wire through the hole and wrap each end around a piece of wood.



- With a helper on the outside, pull the piano wire back and forth in a sawing motion and carefully cut through the rubber dam and adhesive around the entire windshield, then remove the windshield.

**CAUTION:** Hold the piano wire as close to the windshield as possible to prevent damage to the body and dashboard.



- Remove the retainers from the body.

## Installation

- Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in) on the bonding surface around the entire windshield opening flange.

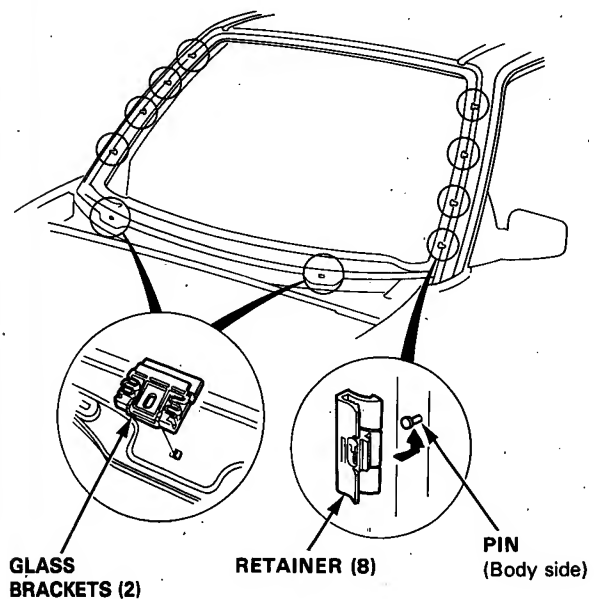
### NOTE:

- Do not scrape down to the painted surface of the body; damaged paint will interfere with proper bonding.
- Remove the rubberdams and side spacers from the body.
- Mask off surrounding surfaces before painting.

- Clean the body bonding surface with a sponge dampened in alcohol.

**NOTE:** After cleaning, keep oil, grease or water from getting on the surface.

- Install the glass brackets and retainers as shown.

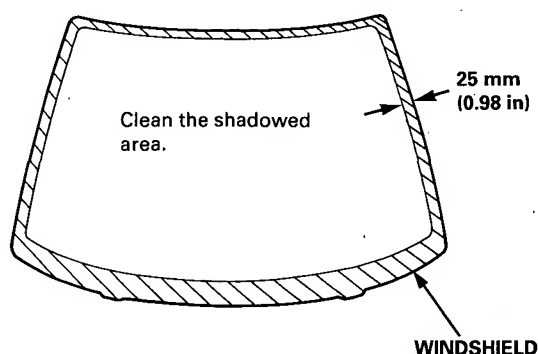




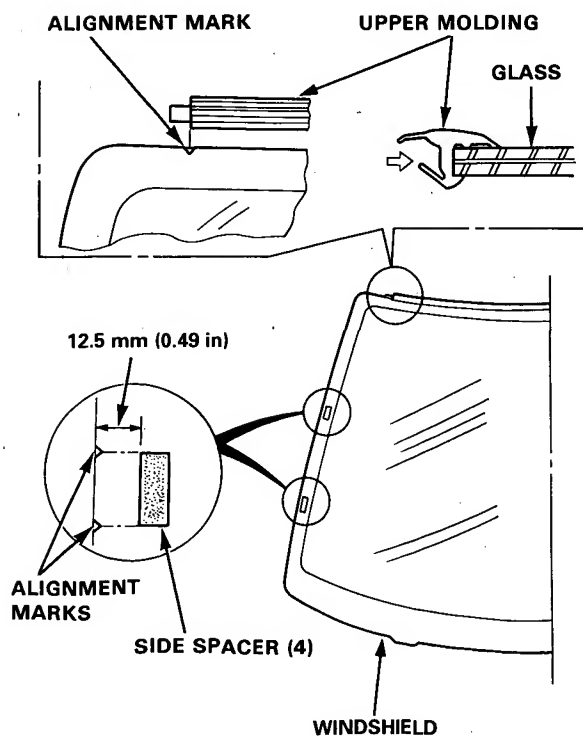
4. If the old windshield is to be reinstalled, use a putty knife to scrape off all traces of old adhesive, then clean the windshield surface with alcohol where new adhesive is to be applied.

NOTE: Make sure the bonding surface is kept free of water, oil and grease.

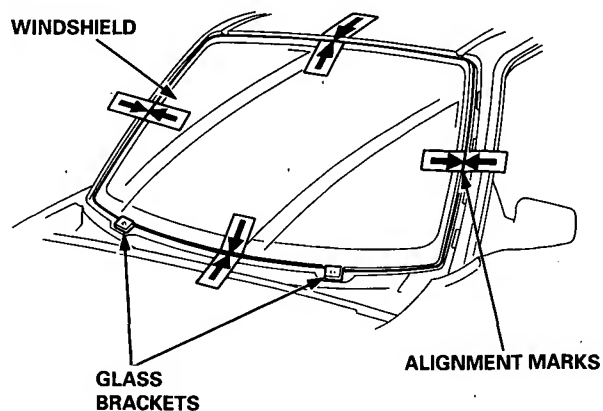
**CAUTION:** Avoid setting the windshield on its edges; small chips may later develop into cracks.



5. Center and glue the upper molding to the upper edge of the windshield. Glue the side spacers to the side edge of the windshield as shown.

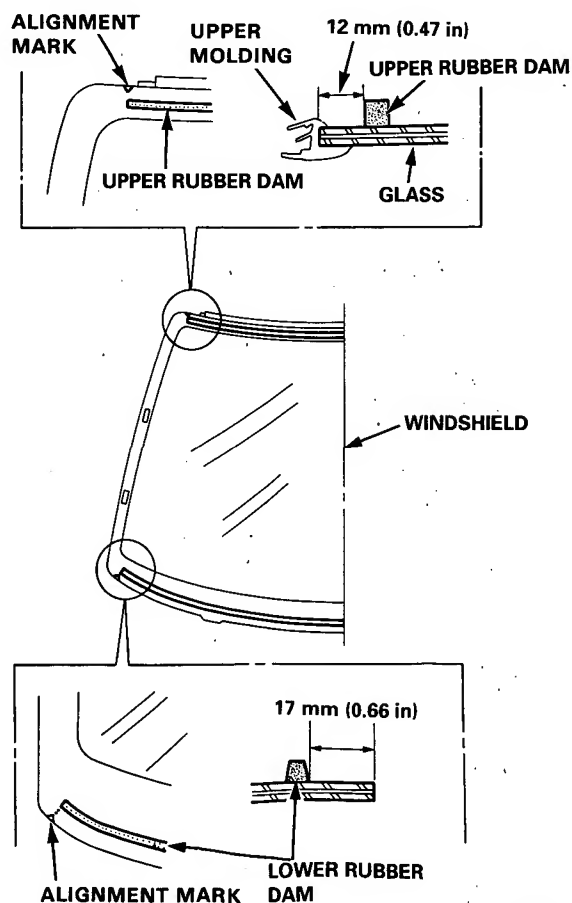


6. Set the windshield upright on the glass brackets, then center it in the opening. Provide alignment marks across the windshield and body with a grease pencil at the four points shown.



7. Glue the upper and lower rubber dams to the inside face of the windshield as shown to contain the adhesive during installation.

NOTE: Be careful not to touch the windshield where adhesive will be applied.



(cont'd)

# Windshield

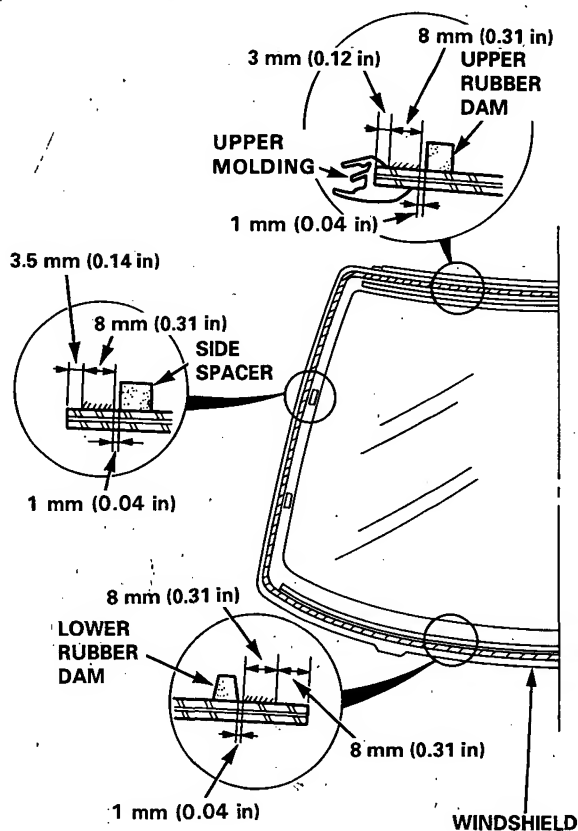
## Installation (cont'd)

8. With a sponge, apply a light coat of glass primer around the edge of the windshield as shown, then lightly wipe it off with gauze or cheesecloth.

### NOTE:

- Do not apply body primer to the windshield, and do not get body and glass primer sponges mixed up.
- Never touch the primed surfaces with your hands. If you do, the adhesive may not bond to the windshield properly, causing a leak after the windshield is installed.
- Keep water, dust, and abrasive materials away from the primed surface.

▨ : Apply glass primer here.

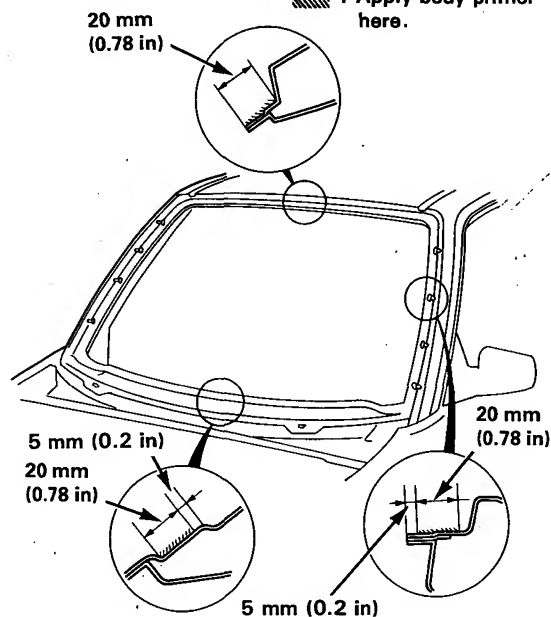


9. With a sponge, apply a light coat of body primer to the original adhesive remaining around the flange. Let the body primer dry for at least ten minutes.

### NOTE:

- Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.
- Mask off the dashboard before painting the flange.

▨ : Apply body primer here.



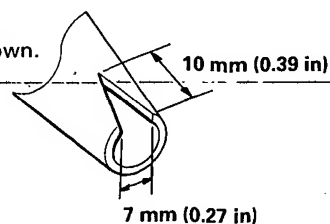
10. Thoroughly mix all the adhesive and hardener together on a glass or metal plate with a putty knife.

### NOTE:

- Clean a glass or metal plate with a sponge and alcohol before mixing.
- Follow the instructions that come with the adhesive.

11. Before filling a cartridge, cut the end of the nozzle as shown.

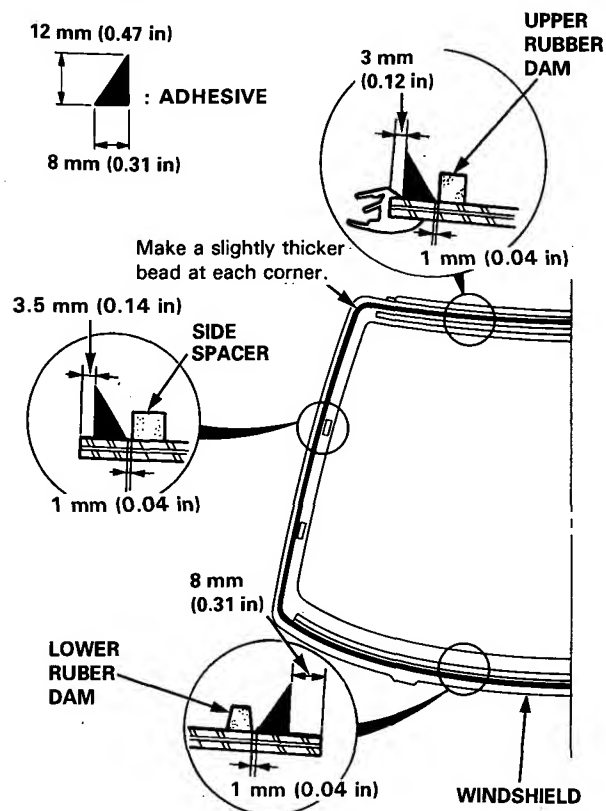
Cut nozzle end as shown.



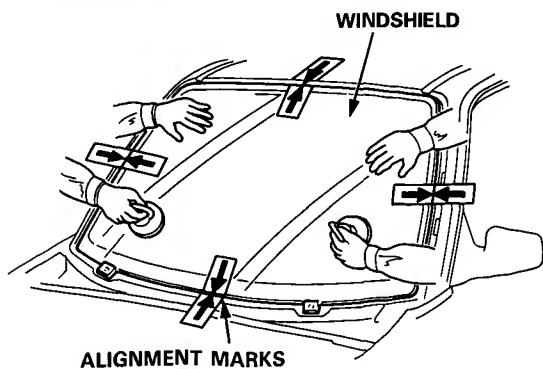


12. Pack adhesive into the cartridge without air pockets to ensure continuous delivery. Put the cartridge in a caulking gun and run a bead of adhesive around the edge of the windshield as shown.

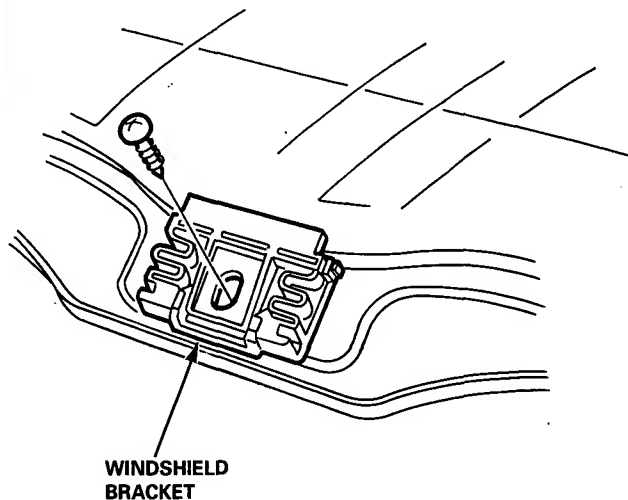
NOTE: Apply the adhesive within thirty minutes after applying the glass primer.



13. Use suction cups to hold the windshield over the opening, alignment marks made in step 6 and set it down on the adhesive. Lightly push on the windshield until its edge is fully seated on the adhesive all the way around.



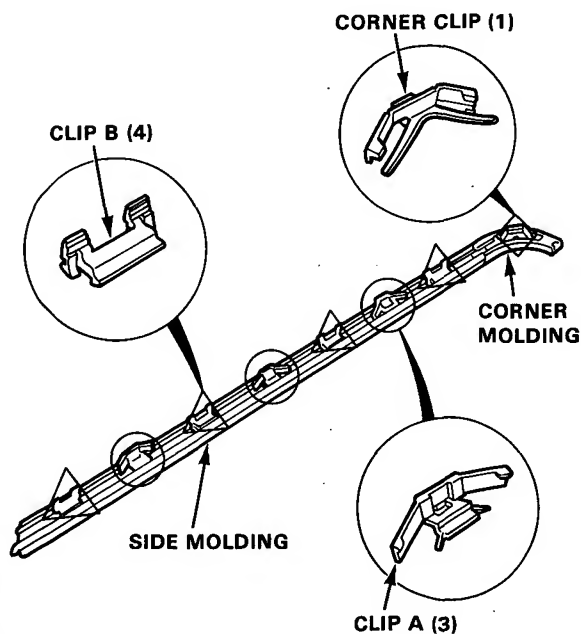
14. Install the windshield brackets to prevent the windshield from falling.



15. Scrape or wipe the excess adhesive off with a putty knife or towel.

NOTE: Wipe with a soft shop towel dampened with alcohol to remove adhesive from a painted surface or windshield.

16. Install the clips on the side molding and corner molding.

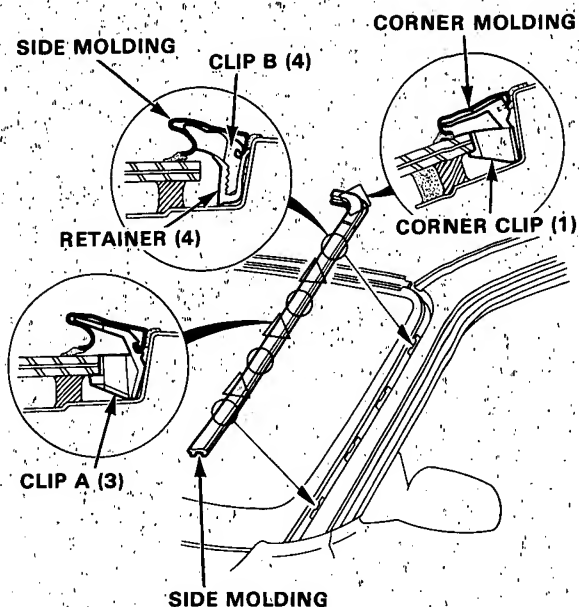


(cont'd)

## Windshield

### Installation (cont'd)

17. Install the side molding.



18. Let the adhesive for dry at least one hour, then spray water over the windshield and check for leaks. Mark leaking areas and let the windshield dry, then seal with sealant.

#### NOTE:

- Let the car stand for dry at least four hours after glass installation. If the car has to be used within the first four hours, it must be driven slowly.
- Keep the windshield dry within the first one hour after installation.
- Check that the ends of the molding are set under the air scoop.

19. Reassemble all removed parts.

NOTE: Install the rearview mirror rubber damper after the adhesive has dried thoroughly.

## Rear Window

### Removal

#### Hatchback:

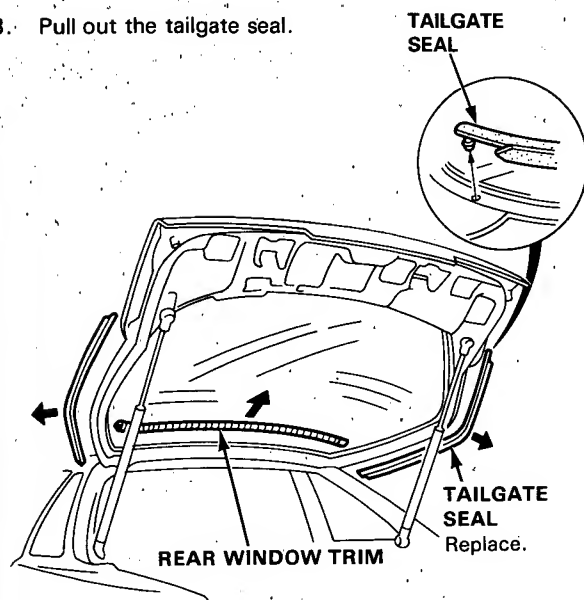
#### CAUTION:

- Use covers to avoid damaging the interior.
- Wear gloves to remove and install the glass.
- Do not damage the defroster grid lines.
- Take care not scratch the rear window molding.

1. To remove the rear window, first remove the:
  - Rear shelf, frame garnish and tailgate trim panel (see page 20-82)
  - High mount brake light (see section 23)
  - Rear wiper (see section 23)

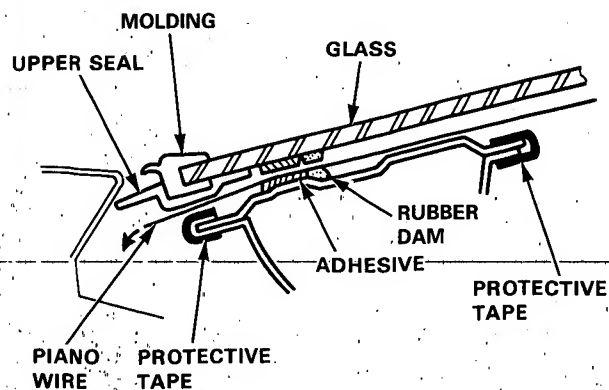
2. Remove the rear window trim.

3. Pull out the tailgate seal.



NOTE: Take care not scratch the rear window.

4. Apply protective tape along the edge of the tailgate.
5. Using an awl, make a hole through the rubber dam and adhesive from the inside, at the top of the tailgate. Push piano wire through the hole and wrap each end around a piece of wood.

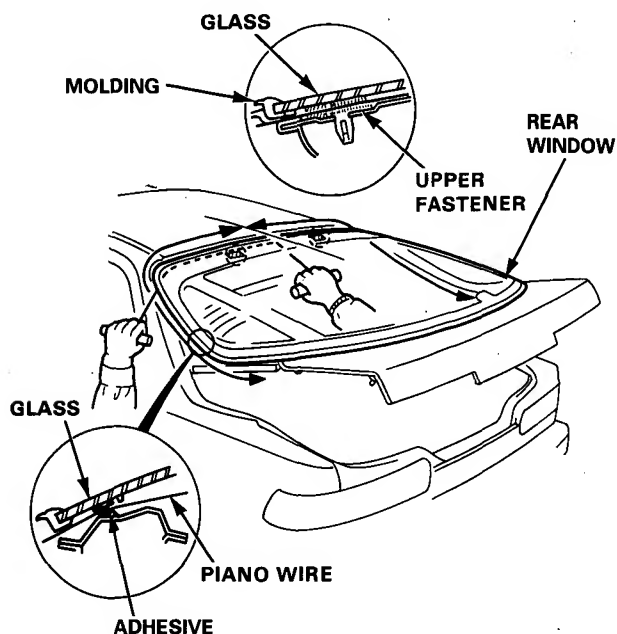






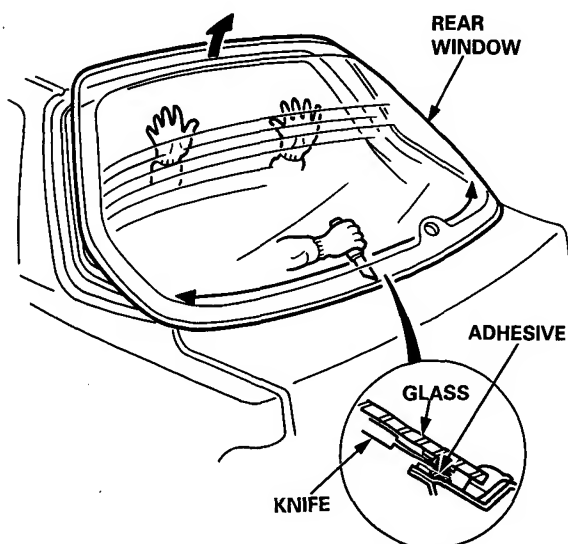
6. With a helper on the outside, pull the piano wire back and forth in a sawing motion and carefully cut through the adhesive the along the top and the sides of the rear window.

**CAUTION:** Hold the piano wire as close to the rear window as possible to prevent damage to the body and molding.



7. Cut the rear window adhesive with a knife at the bottom of the rear window, then remove the rear window.

**NOTE:** Do not use piano wire in this area.



**NOTE:** Replace the upper seal, spacers and fasteners with new ones whenever the rear window has been removed.

## Installation

1. Scrape the old adhesive smooth with a knife to a thickness of about 2 mm (0.08 in) in the bonding surface around the entire rear window flange.

### NOTE:

- Do not scrape down to the painted surface of the body; damaged paint will interfere with proper bonding.
- Remove the rubber dams, fasteners and spacers from the tailgate.
- Mask off surrounding surfaces before painting.

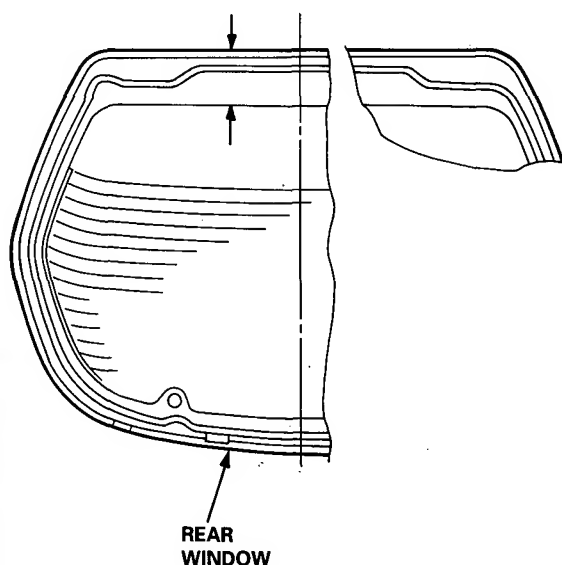
2. Clean the tailgate bonding surface with a sponge dampened in alcohol.

**NOTE:** After cleaning, keep oil, grease or water from getting on the surface.

3. If the old rear window is to be reinstalled, use a putty knife to scrape off all traces of old adhesive, then clean the rear window surface with alcohol where new adhesive is to be applied.

**NOTE:** Make sure the bonding surface is kept free of water, oil and grease.

**CAUTION:** Avoid setting the rear window on its edges; small chips may later develop into cracks.

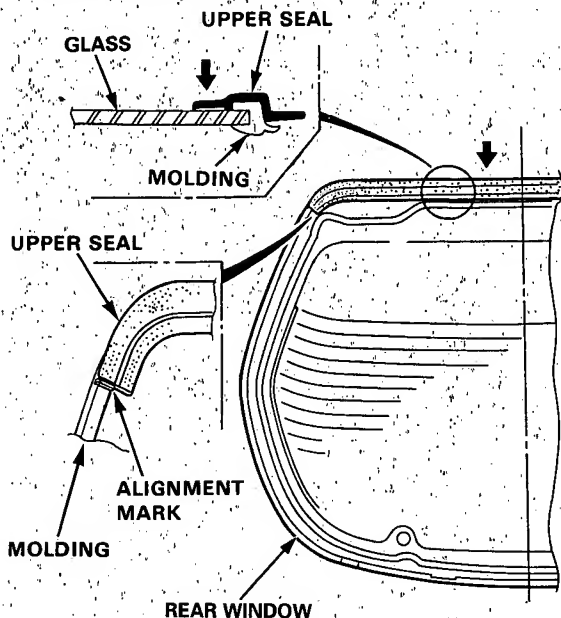


(cont'd)

# Rear Window

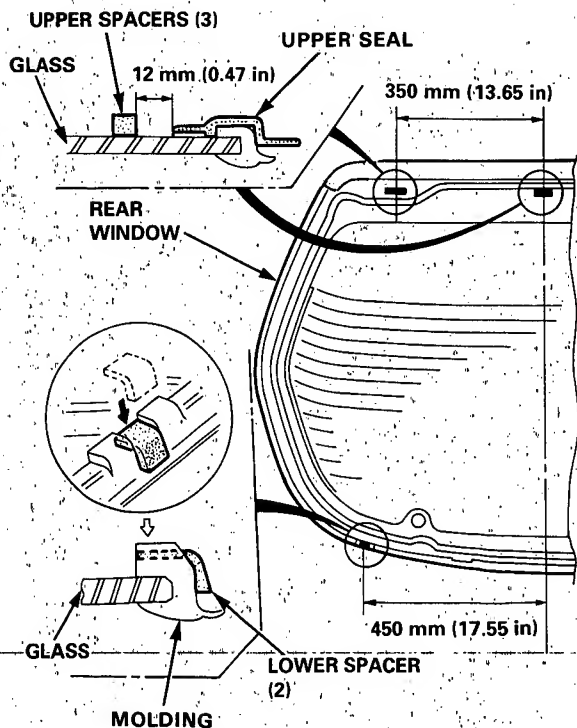
## Installation (cont'd)

4. Apply the upper seal to the inside face of rear window as shown.

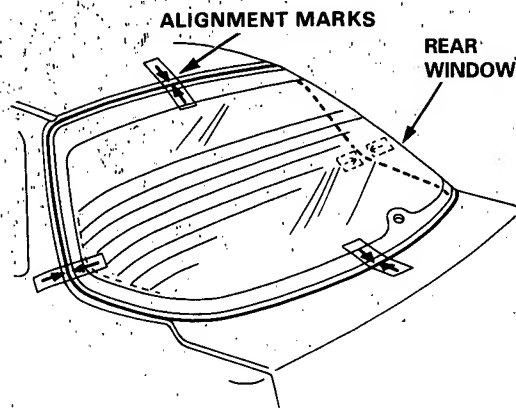


5. Glue the upper spacers and lower spacers to the inside face of the rear window and molding as shown.

NOTE: Be careful not to touch the rear window where adhesive will be applied.



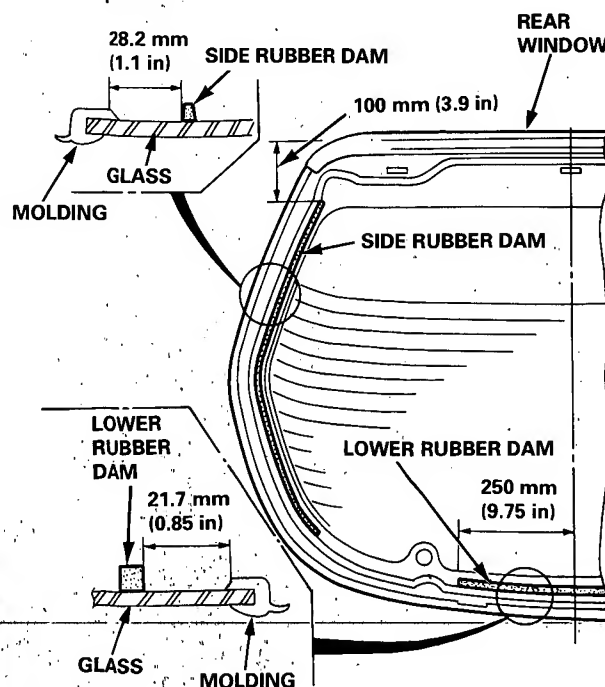
6. Set the rear window upright on the tailgate, then center it in the opening. Provide alignment marks across the rear window and body with a grease pencil at the four points shown.



7. Center and glue the side and lower rubber dams to the inside face of the rear window as shown to contain the adhesive during installation.

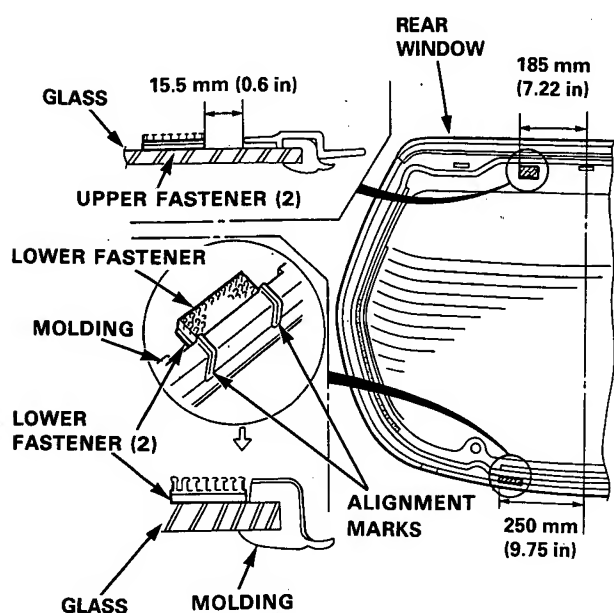
NOTE:

- Be careful not to touch the rear window where adhesive will be applied.
- Mask off surrounding surfaces before applying primer.

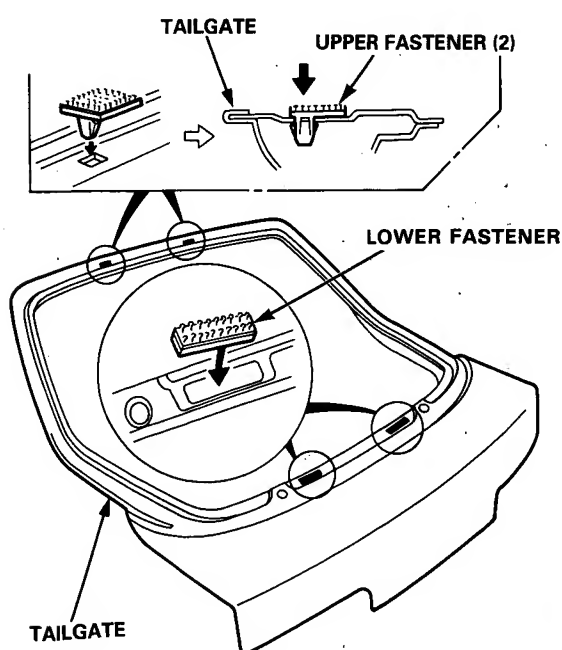




8. Glue the upper fasteners and lower fasteners to the inside face of the rear window as shown.



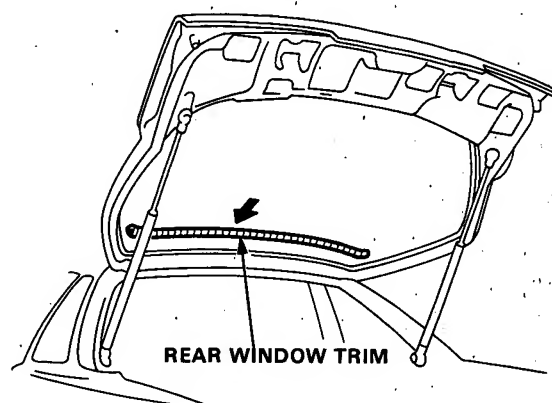
9. Install the tailgate upper fasteners and glue the lower fasteners to the tailgate as shown.



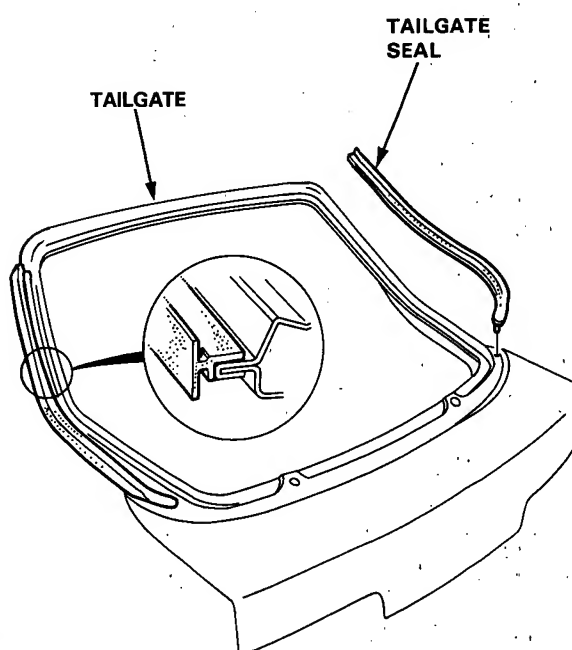
10. Install the rear window trim in the tailgate.

**NOTE:**

- Install the rear window trim with the wide end on the interior side.
- When attaching the rear window trim, make sure the thickness is even all the way around.



11. Install the tailgate seals.



(cont'd)

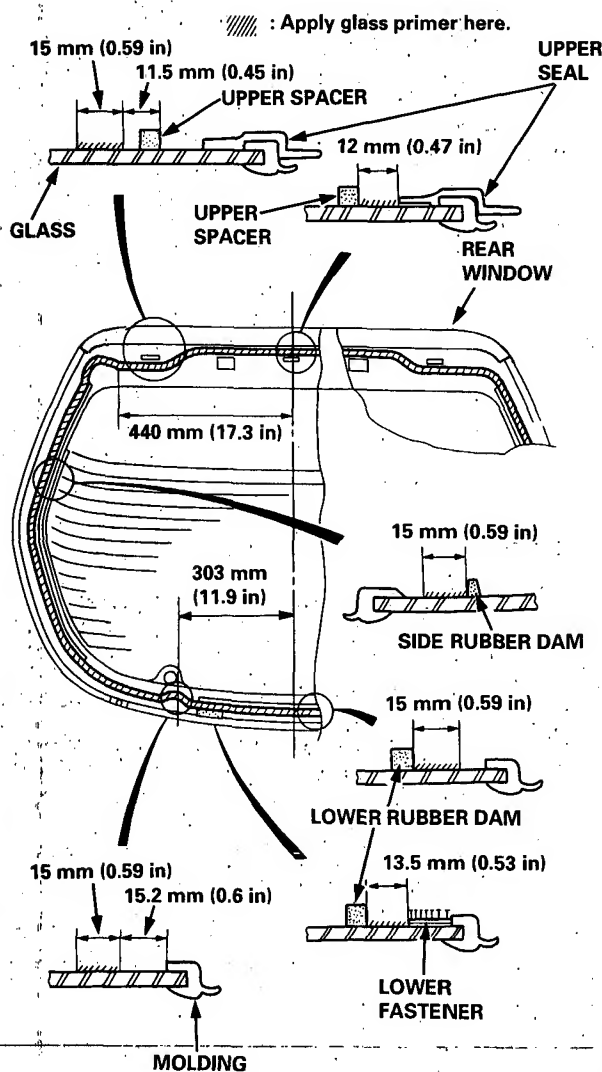
# Rear Window

## Installation (cont'd)

12. With a sponge, apply a light coat of glass primer around the edge of the rear window, then lightly wipe it off with gauze or cheesecloth.

### NOTE:

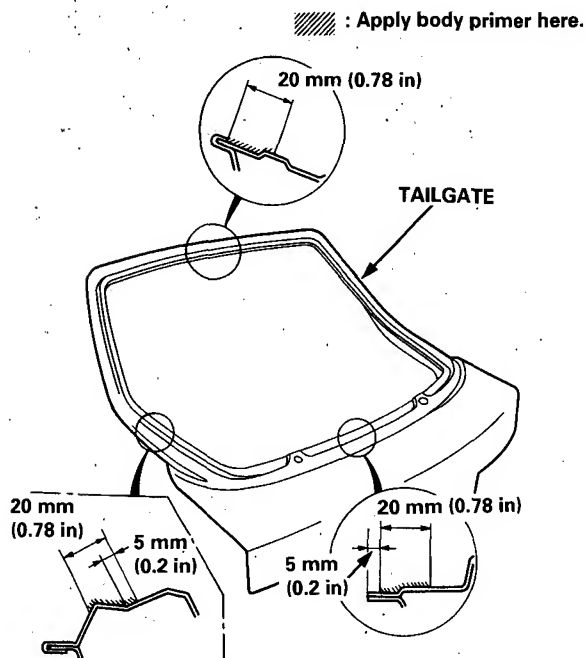
- Do not apply body primer to the rear window, and do not get body and glass primer sponges mixed up.
- Never touch the primed surfaces with your hands. If you do, the adhesive may not bond to the rear window properly, causing a leak after the rear window is installed.
- Keep water, dust, and abrasive materials away from the primed surface.



13. With a sponge, apply a light coat of body primer to the original adhesive remaining around the rear window opening flange. The rear window should be installed ten minutes after you apply the body primer.

### NOTE:

- Do not apply glass primer to the tailgate, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.

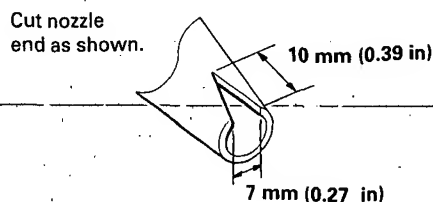


14. Thoroughly mix the adhesive and hardener together on a glass or metal plate.

### NOTE:

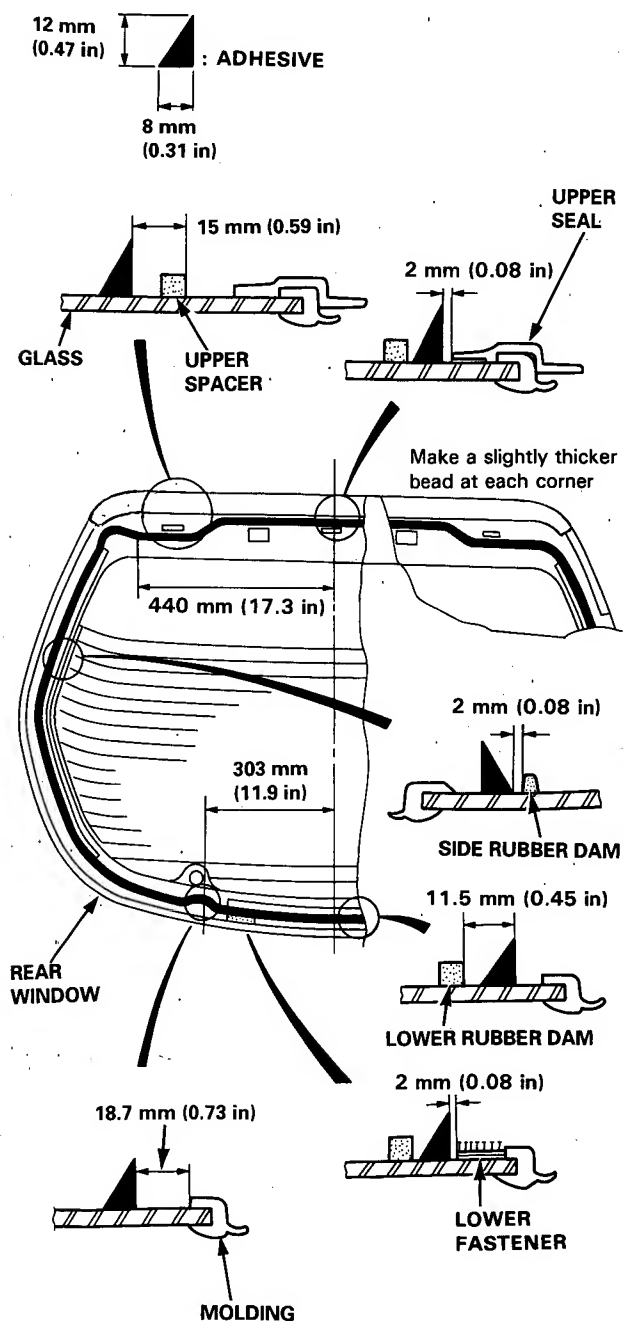
- Clean a glass or metal plate with a sponge and alcohol before mixing.
- Follow the instructions that came with the adhesive.

15. Before filling a cartridge, cut the end of the nozzle as shown.





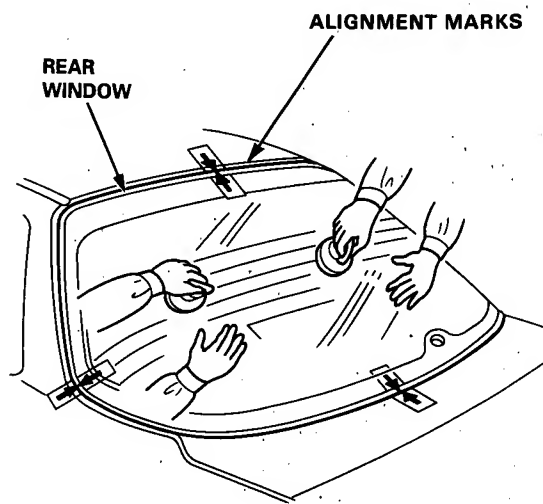
16. Pack adhesive into the cartridge without air pockets to ensure continuous delivery. Put the cartridge in a caulking gun and run a bead of adhesive around the edge of the rear window as shown.



NOTE: Apply the adhesive within thirty minutes after applying the glass primer.

17. Use suction cups to hold the rear window over the opening, alignment marks made in step 6 and set it down on the adhesive. Lightly push on the rear window until its edges are fully seated on the adhesive all the way around.

NOTE: Do not open or close the doors until the adhesive is dry.



18. Scrape or wipe the excess adhesive off with a putty knife or towel.

NOTE: Use a soft shop towel dampened with alcohol to remove adhesive from a painted surface or rear window.

19. Let the adhesive dry for at least one hour, then spray water over the rear window and check for leaks. Mark leaking areas and let the rear window dry, then seal with sealant.

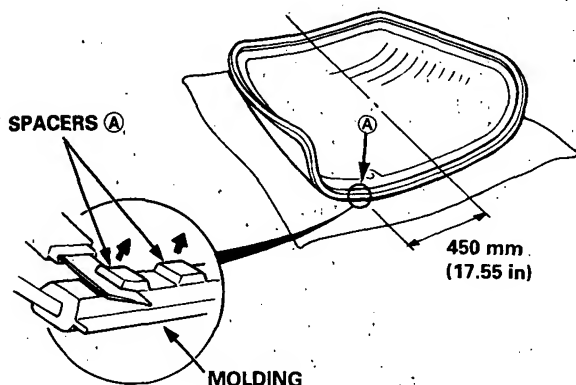
NOTE: Let the car stand for at least four hours after rear window installation. If the car has to be used within the first four hours, it must be driven slowly.

20. Reinstall all remaining removed parts.

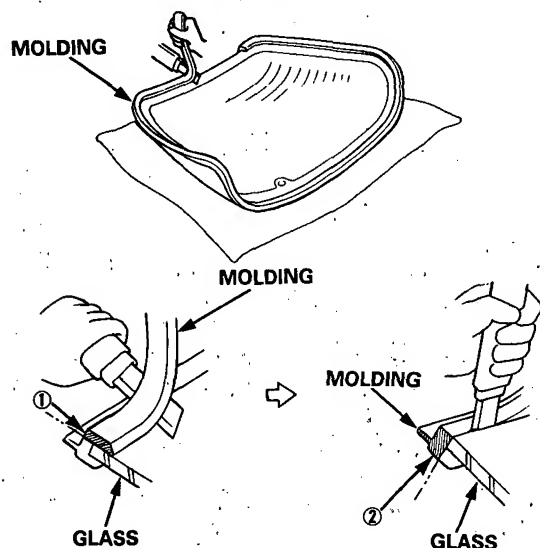
# Rear Window Molding

## Replacement

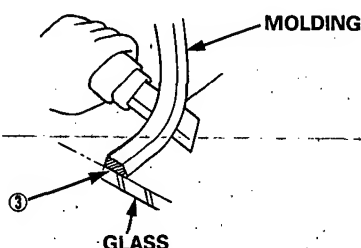
1. Remove the rear window, then remove the lower fastener and upper seal.
2. Place the rear window upside down on a pad as shown.  
**CAUTION: Avoid setting the rear window on its edges; small chips may later develop into cracks.**
3. With a helper holding the rear window, carefully cut off the spacers **A** with a knife.  
**NOTE: Cut off the spacers **A** flush with the molding as they will be reused on the new molding.**



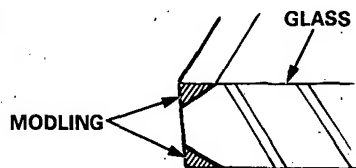
4. Cut the inner side rubber portion **1** off the molding, then cut the top rubber portion **2**.



5. Turn the rear window over, then cut the outer side rubber portion **3** of the molding.



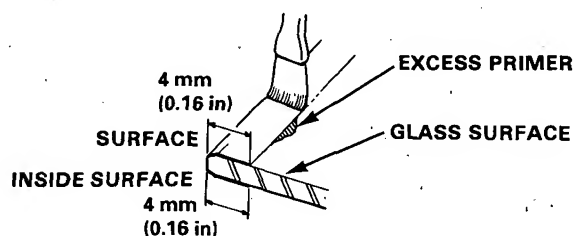
6. Scrape all traces of old molding from the chamfered edges of the rear window.  
**NOTE: Be sure to scrape all traces of old molding thoroughly.**



7. Clean the rear window surface with alcohol where new molding is to be installed.

**NOTE: Make sure the surface is kept free of water, oil and grease.**

8. With a brush, apply a light coat of glass primer around the edge of the glass.

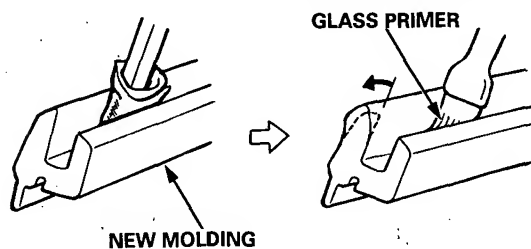


**NOTE: Scrape off excess glass primer with a putty knife after installing new molding.**

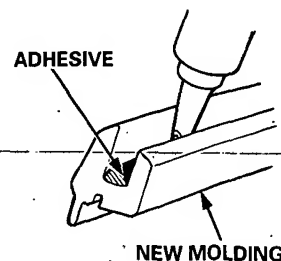
9. Degrease the inner surfaces of new molding thoroughly, then apply a light coat of glass primer to the surfaces.

**NOTE:**

- Apply glass primer around the entire groove of the new molding.
- Do not apply glass primer to the outer surface.

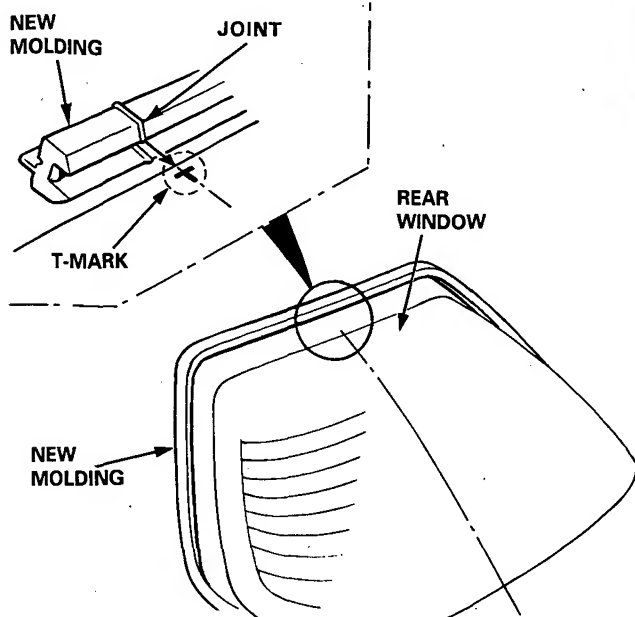


10. Run a bead of adhesive in the groove of the new molding.



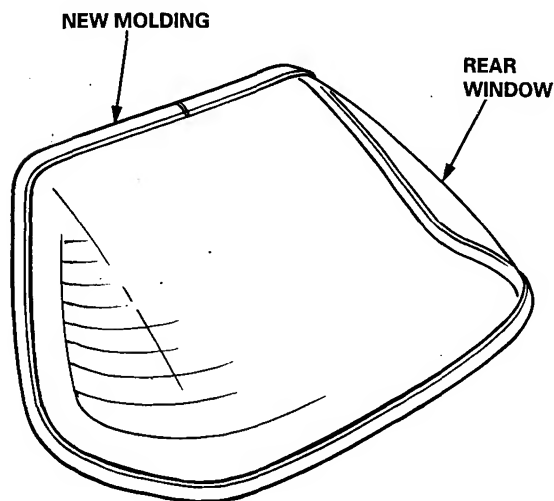


11. Place the rear window right-side up, then align the joint of the new molding with the "T" mark at the top of the rear window as shown.



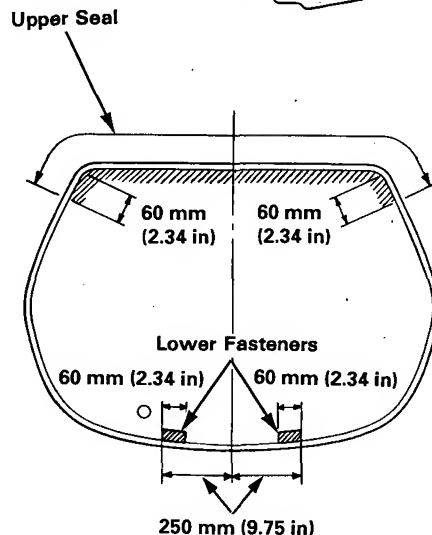
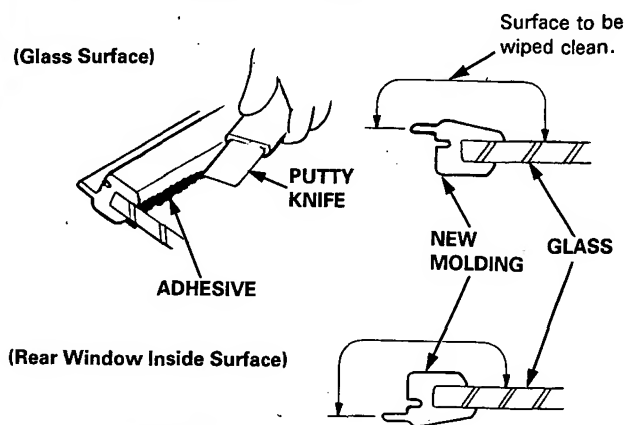
12. Press the new molding into position around the entire edge of the rear window.

NOTE: Check that the new molding is not wrinkled or lifted away at corners.

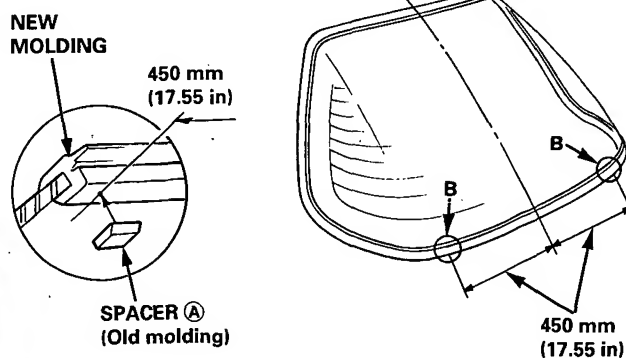


13. Scrape or wipe the excess adhesive off with a putty knife or gauge.

NOTE: Use a soft shop towel dampened with alcohol to remove adhesive from a painted surface, upper seal, lower fastener or glass.



14. Position and glue the spacers (A) (retained from the old molding) to the back of the molding as shown.



►: Locations

# Rear Window

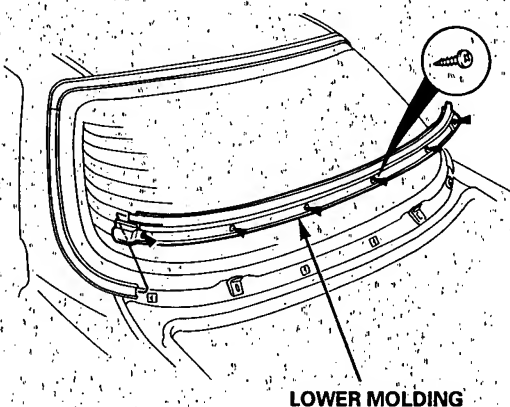
## Removal

Sedan:

### CAUTION:

- Wear gloves to remove and install the glass.
- Do not damage the defroster grid lines.

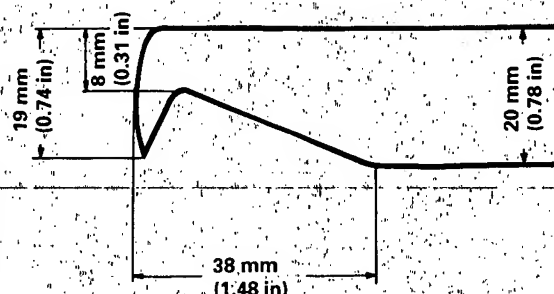
1. To remove the rear window, first remove:
    - Rear shelf (see page 20-62)
    - Rear pillar trim panel (see page 20-62)
  2. Disconnect the defroster leads, and remove their holders.
- NOTE: Avoid scratching the rear window with the cutter blade.
3. Remove the screws, then remove the lower molding.



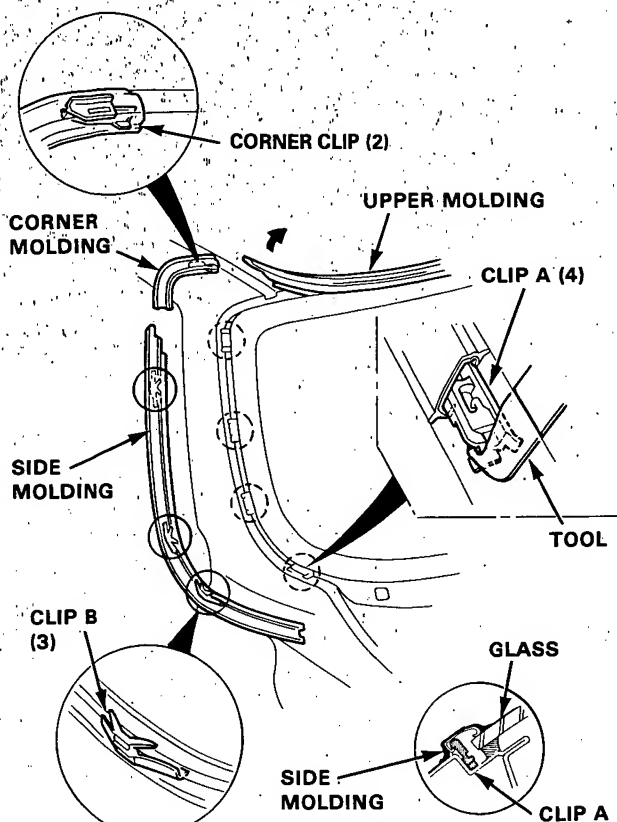
NOTE: You will need a molding clip release tool to remove some moldings. If necessary, make one that has the dimensions shown:

### Molding Clip Release Tool

Thickness: 2 mm (0.08 in), pointed at the end.



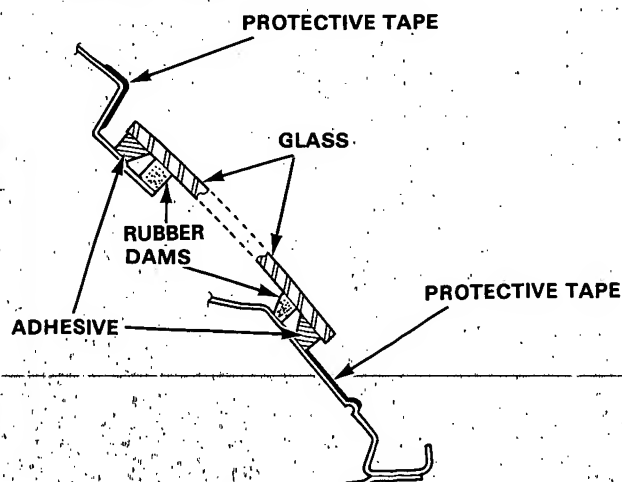
4. Remove the side and corner molding with a molding clip release tool.
5. Detach the clips and remove the corner and side moldings.
6. Pull away the upper molding.



7. Lower the rear of the headliner.

CAUTION: Take care not to bend the headliner excessively.

8. Apply protective tape along the edge of the body next to the rear window as shown.

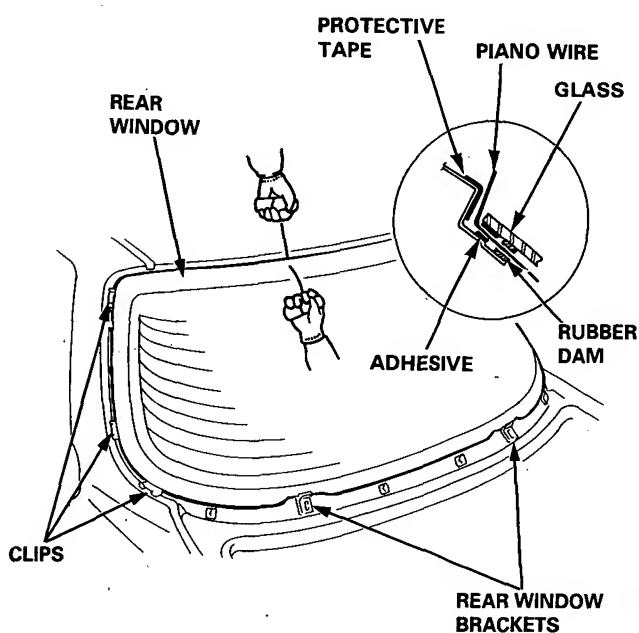






9. Using an awl, make a hole through the rear window adhesive from inside the car. Push piano wire through the hole and wrap each end around a piece of wood.
10. With a helper on the outside, pull the wire back and forth in a sawing motion and carefully cut through the adhesive around the entire rear window, then remove the rear window.

**CAUTION:** Hold the piano wire as close to the rear window as possible to prevent damage to the body.



11. Remove the clips and rear window brackets from the body.

## Installation

1. Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in) on the bonding surface around the entire rear window flange.

**NOTE:**

- Do not scrape down to the painted surface of the body; damaged paint will interfere with proper bonding.
- Remove the rubber dams and spacers from the body.
- Mask off surrounding surfaces before applying primer.

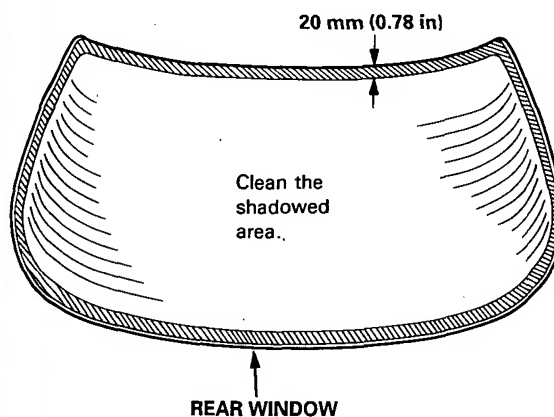
2. Clean the body bonding surface with a sponge dampened in alcohol.

**NOTE:** After cleaning, keep oil, grease or water from getting on the surface.

3. If the old rear window is to be reinstalled, use a putty knife to scrape off all traces of old adhesive, then clean the rear window surface with alcohol where new adhesive is to be applied.

**NOTE:** Make sure the bonding surface is kept free of water, oil and grease.

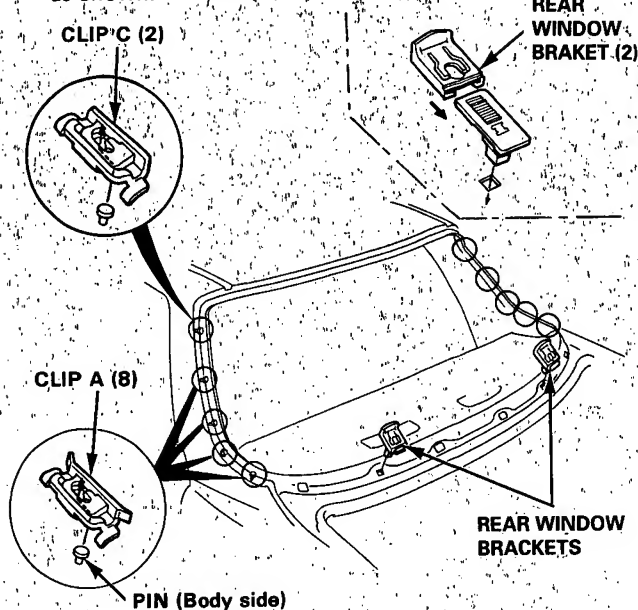
**CAUTION:** Avoid setting the rear window on its edges; small chips may later develop into cracks.



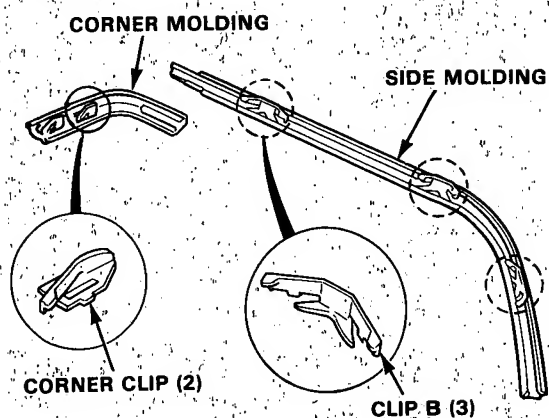
(cont'd)

# Rear Window Installation (cont'd)

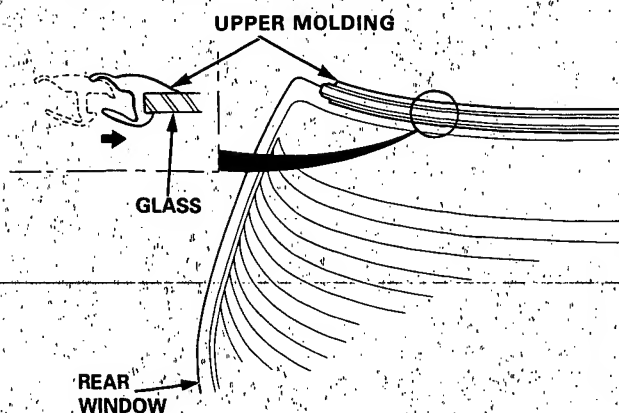
4. Install the molding clips and rear window brackets as shown:



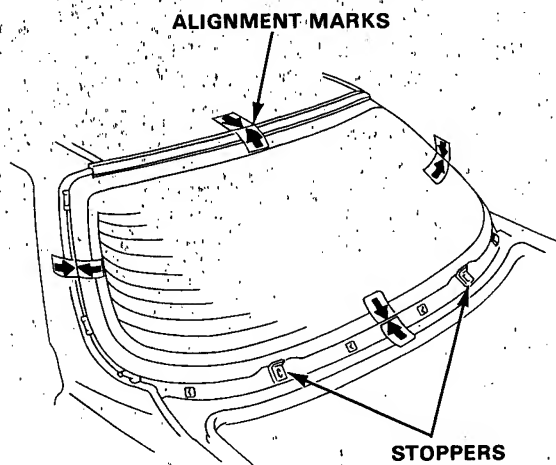
5. Attach the clips to the side and corner moldings as shown:



6. Center and glue the upper molding to the upper edge of the rear window as shown:

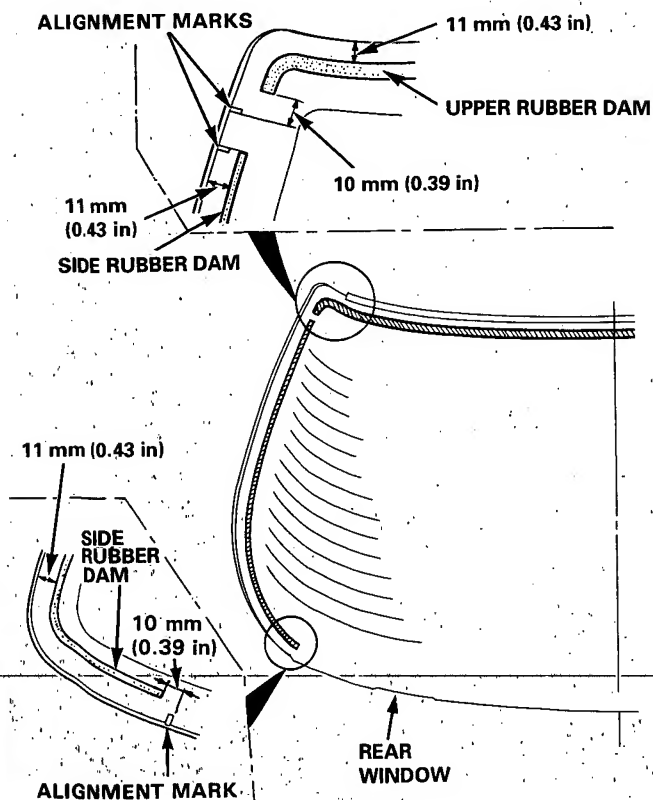


7. Set the rear window upright on the rear window brackets, then center it in the opening. Provide alignment marks across the rear window and body with a grease pencil at the four points shown.



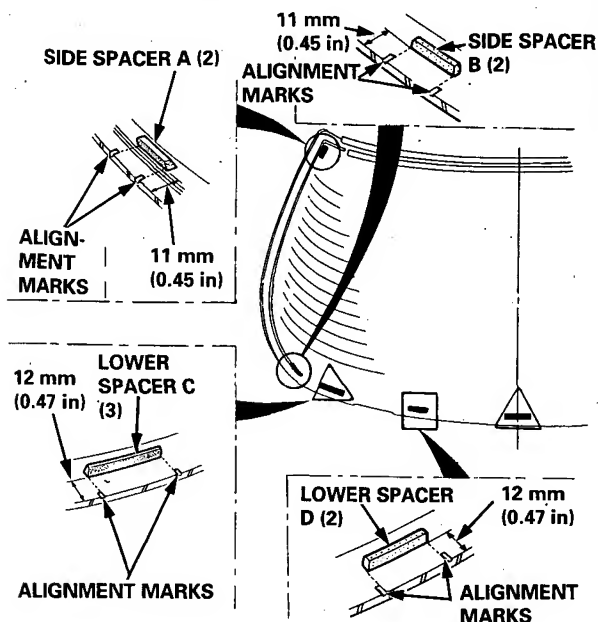
8. Glue the upper and side rubber dams to the inside face of the rear window as shown to contain the adhesive during installation.

NOTE: Be careful not to touch the rear window where adhesive will be applied.





9. Glue the side and lower spacers to the inside face of the rear window as shown.

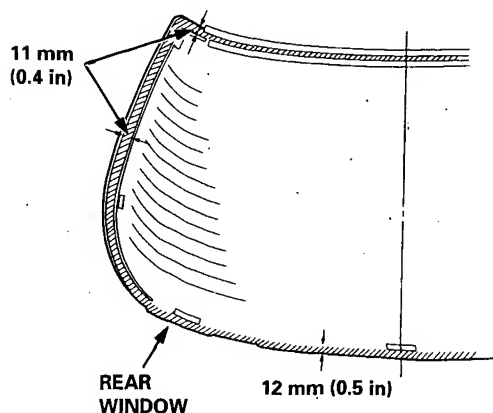


10. With a sponge, apply a light coat of glass primer around the edge of the rear window as shown, then lightly wipe it off with gauze or cheesecloth.

**NOTE:**

- Do not apply body primer to the glass, and do not get body and glass primer sponges mixed up.
- Never touch the primed surfaces with your hands. If you do, the adhesive may not bond to the rear window properly, causing a leak after the rear window is installed.
- Keep water, dust, and abrasive materials away from the primed surface.

▨ : Apply glass primer here.

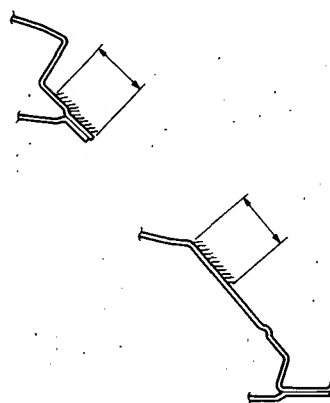


11. With a sponge, apply a light coat of body primer to the original adhesive remaining around the rear window opening flange. The rear window should be installed ten minutes after you apply the primer.

**NOTE:**

- Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.

▨ : Apply body primer here.

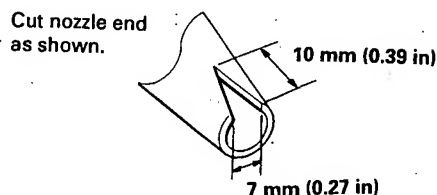


12. Thoroughly mix the adhesive and hardener together on a glass or metal plate with a putty knife.

**NOTE:** Clean a glass or metal plate with a sponge and alcohol before mixing.

13. Follow the instructions that came with the adhesive.

14. Before filling a cartridge, cut the end of the nozzle as shown.



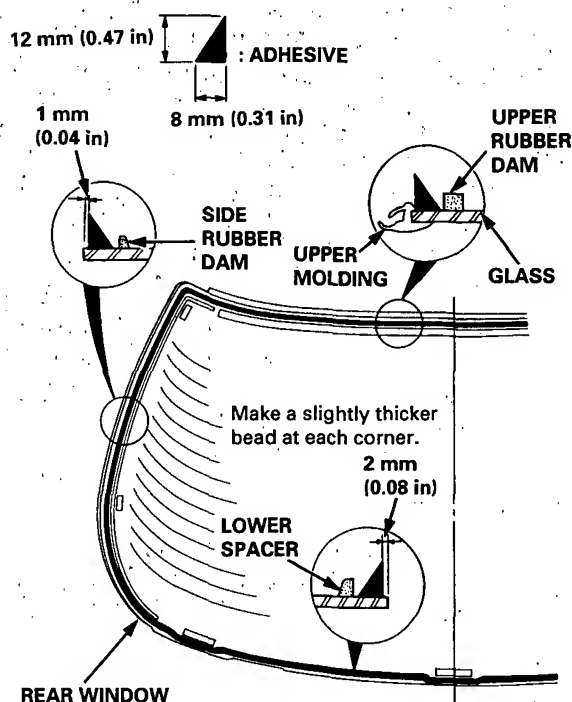
(cont'd)

# Rear Window

## Installation (cont'd)

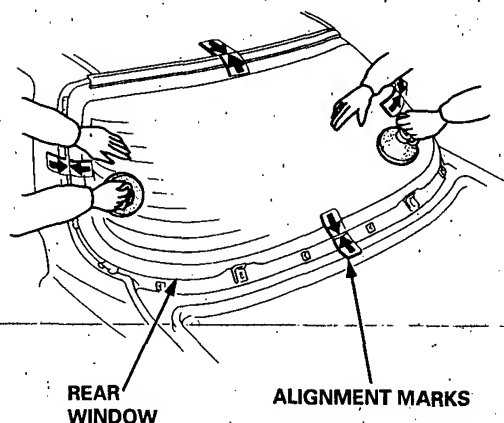
15. Pack adhesive into the cartridge without air pockets to ensure continuous delivery. Put the cartridge in a caulking gun and run a bead of adhesive around the edge of the rear window as shown.

NOTE: Apply the adhesive within thirty minutes after applying the glass primer.



16. Use suction cups to hold the rear window over the opening, alignment marks made in step 7 and set it down on the adhesive. Lightly push on the rear window until its edges are fully seated on the adhesive all the way around.

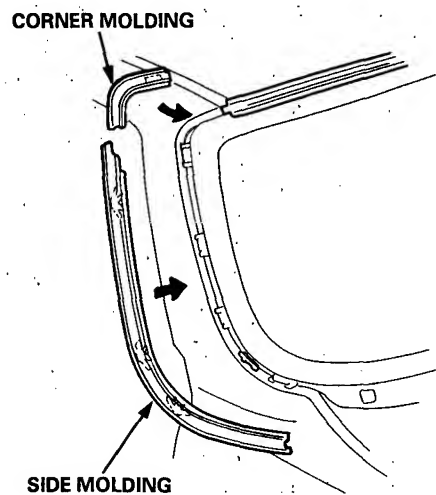
NOTE: Do not close or open the doors until adhesive is dry.



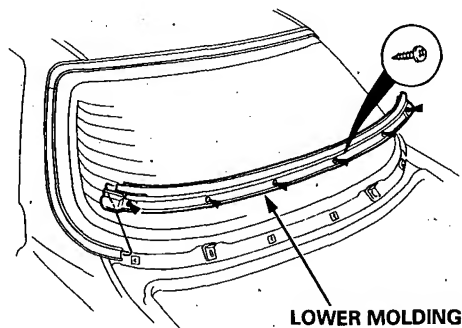
17. Scrape or wipe the excess adhesive off with a putty knife or towel.

NOTE: Use a soft shop towel dampened with alcohol to remove adhesive from a painted surface or rear window.

18. Install the right and left corner moldings, and side moldings.



19. Install the lower molding.



20. Let the adhesive dry for at least one hour, then spray water over the rear window and check for leaks. Mark leaking areas and let the rear window dry, then seal with sealant.

NOTE: Let the car stand for at least four hours after glass installation. If the car has to be used within the first four hours, it must be driven slowly.

21. Raise the headliner back into position, then install:

- Rear pillar trim panel
- Rear shelf

# Quarter Glass



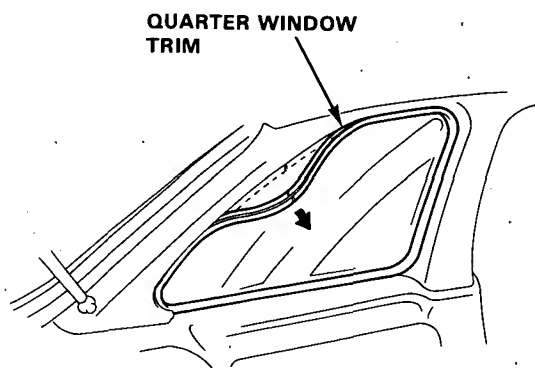
## Removal

Hatchback:

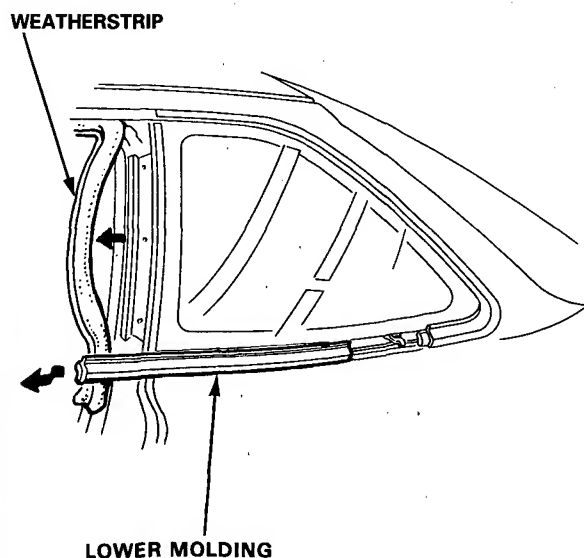
**CAUTION:** Wear gloves to remove and install the quarter glass.

**NOTE:** To remove the quarter glass, first remove the rear seat (see page 20-66).

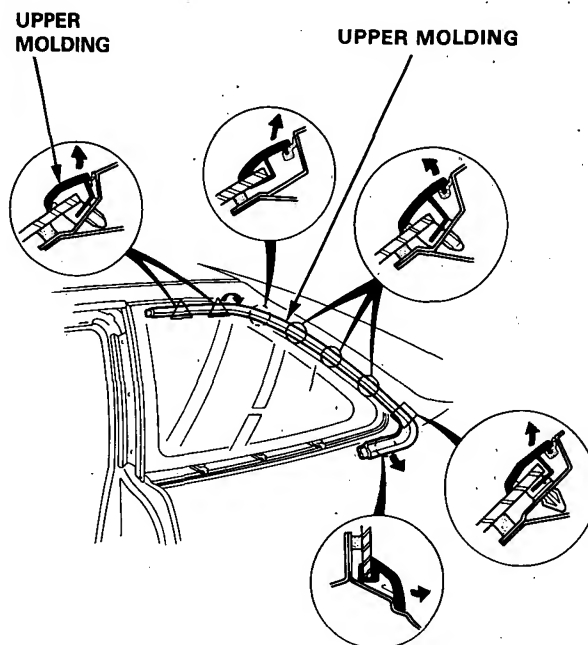
1. Remove the quarter window trim.



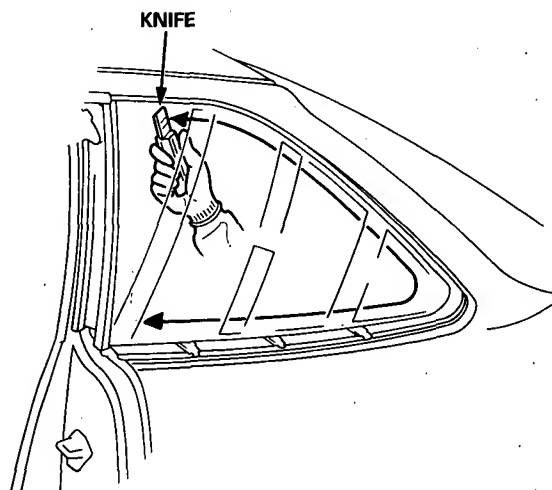
2. Pull away the weatherstrip.  
Remove the lower molding by sliding it forward.



3. Remove the upper molding by turning it as shown:



4. Use a knife to cut through the glass adhesive from inside the car, all the way around.

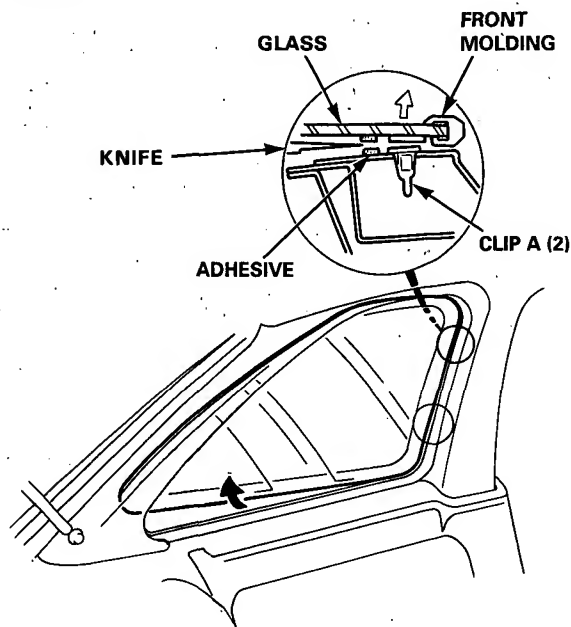


(cont'd)

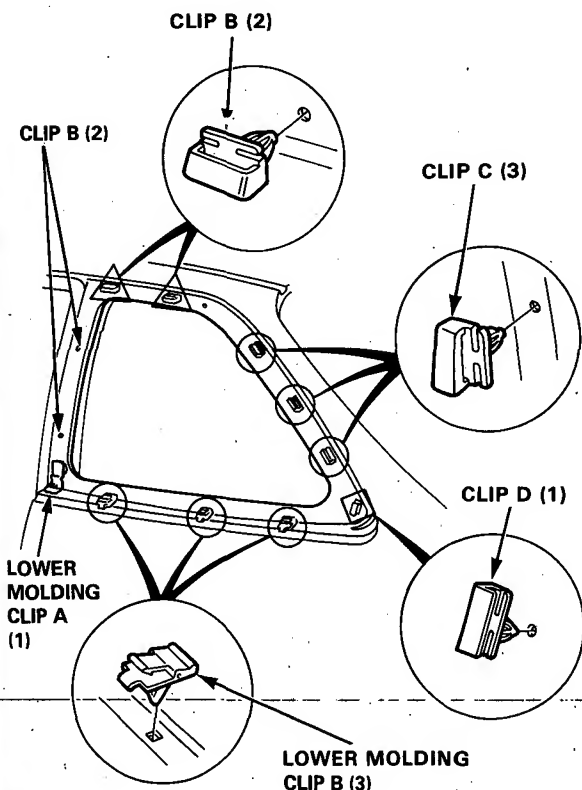
# Quarter Glass

## Removal (cont'd)

- As an assembly, pry the quarter glass and front moldings away from the car at the clip points shown.



- Remove the clips, being careful not to let them fall into the body.



## Installation

- Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in) on the bonding surface around the entire window glass flange.

### NOTE:

- Do not scrape down to the painted surface of the body; damaged paint will interfere with proper bonding.
- Mask off surrounding surfaces before applying primer.

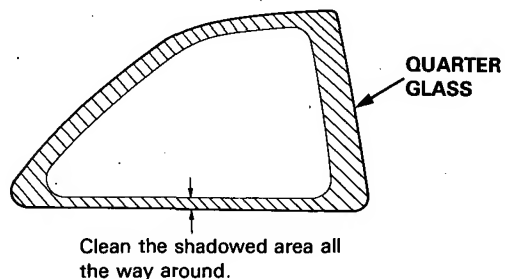
- Clean the body bonding surface with a sponge dampened in alcohol.

NOTE: After cleaning, keep oil, grease or water from getting on the surface.

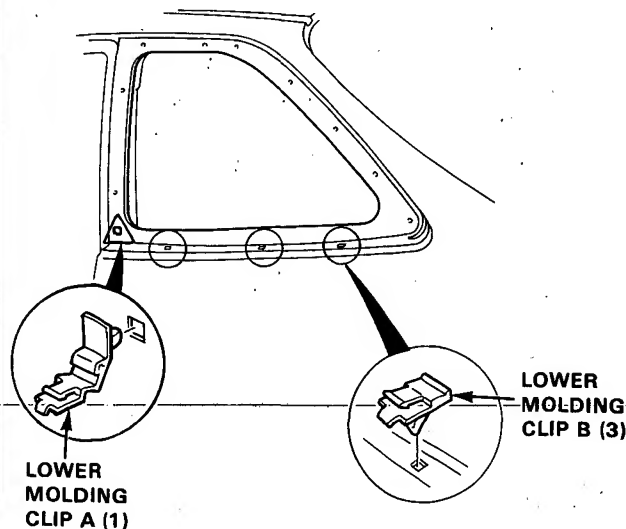
- If the old quarter glass is to be reinstalled, use a putty knife to scrape off all traces of old adhesive, then clean the quarter glass surface with alcohol where new adhesive is to be applied.

NOTE: Make sure the bonding surface is kept free of water, oil and grease.

**CAUTION:** Avoid setting the glass on its edges; small chips may later develop into cracks.

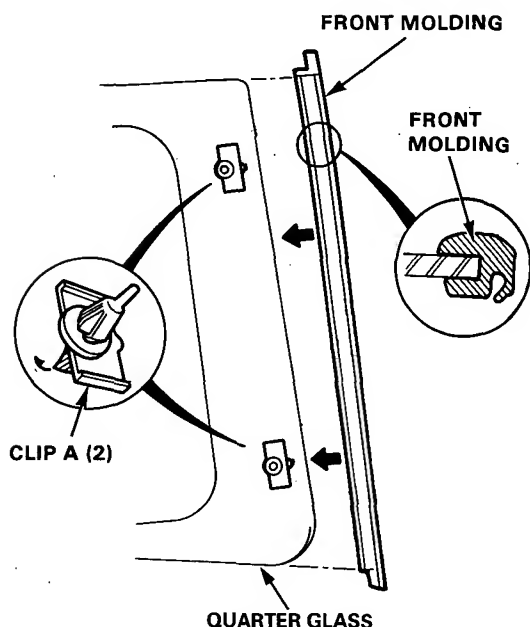


- Install the lower molding clips.

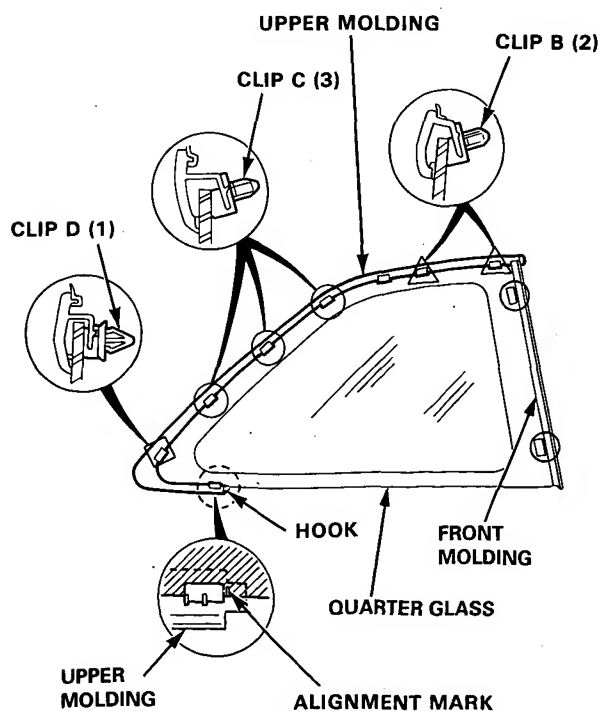




5. Glue the front molding to the front edge of the quarter glass as shown.
6. Peel the backing off each clip A, then install them by pressing them firmly into place at the locations shown.



7. Install the upper molding on the quarter glass by using the clips shown.

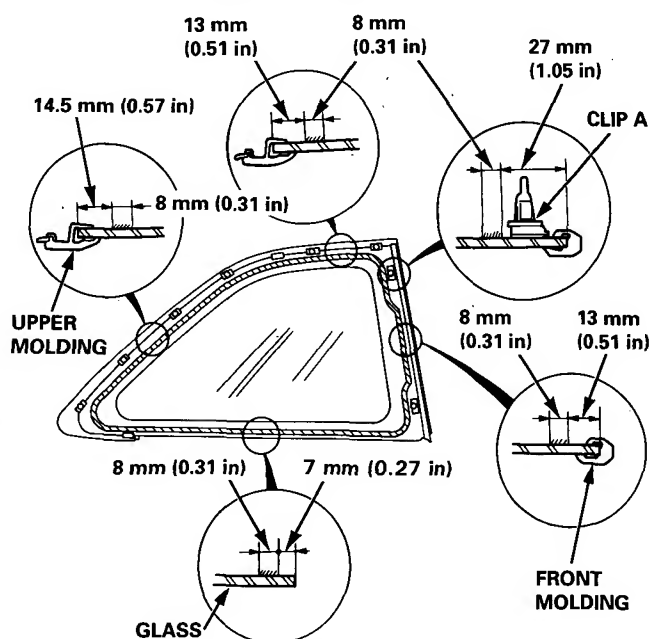


8. With a sponge, apply a light coat of glass primer around the edge of quarter glass as shown, then lightly wipe it off with gauze or cheesecloth.

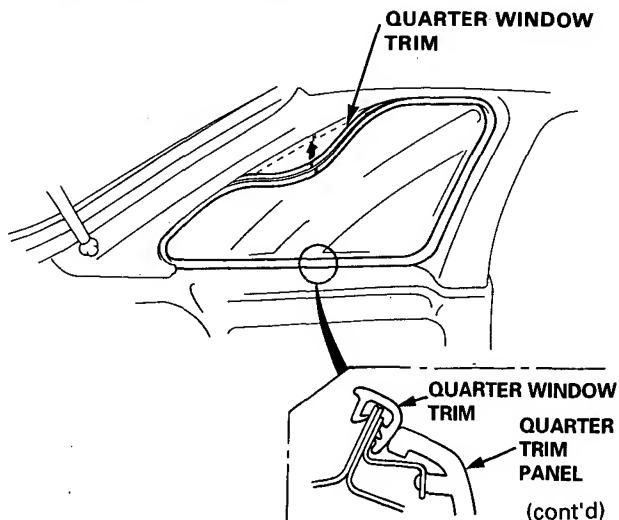
**NOTE:**

- Do not apply body primer to the glass, and do not get body and glass primer sponges mixed up.
- Never touch the primed surfaces with your hands. If you do, the adhesive may not bond to the quarter glass properly, causing a leak after the quarter glass is installed.
- Keep water, dust, and abrasive materials away from the primed surface.

/// : Apply glass primer here..



9. Install the quarter window trim.



# Quarter Glass

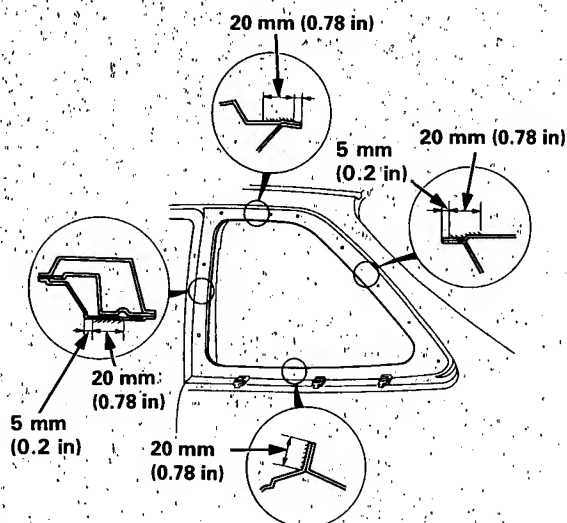
## Installation (cont'd)

- With a sponge, apply a light coat of body primer to the original adhesive remaining around the quarter glass opening flange. The quarter glass should be installed ten minutes after you apply the primer.

### NOTE:

- Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.

/// : Apply body primer here.

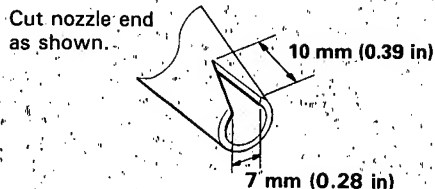


- Thoroughly mix the adhesive and hardener together on a glass or metal plate with a putty knife.

### NOTE:

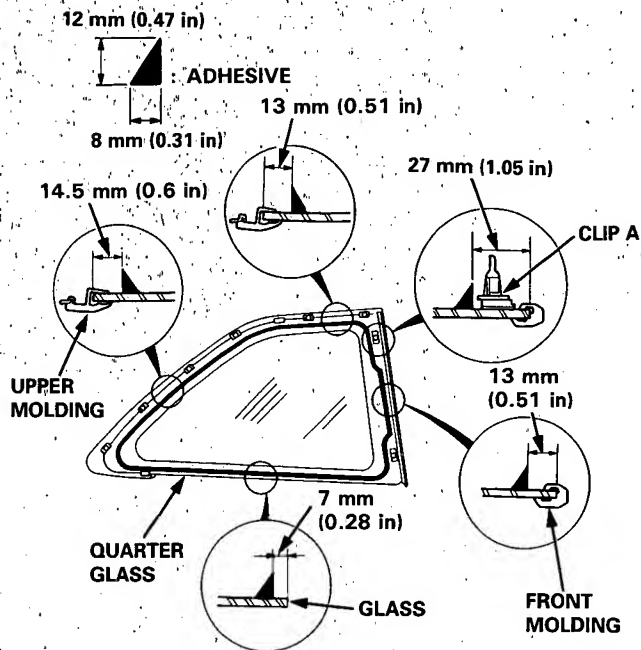
- Clean a glass or metal plate with a sponge and alcohol before mixing.
- Follow the instructions that came with the adhesive.

- Before filling a cartridge, cut the end of the nozzle as shown.



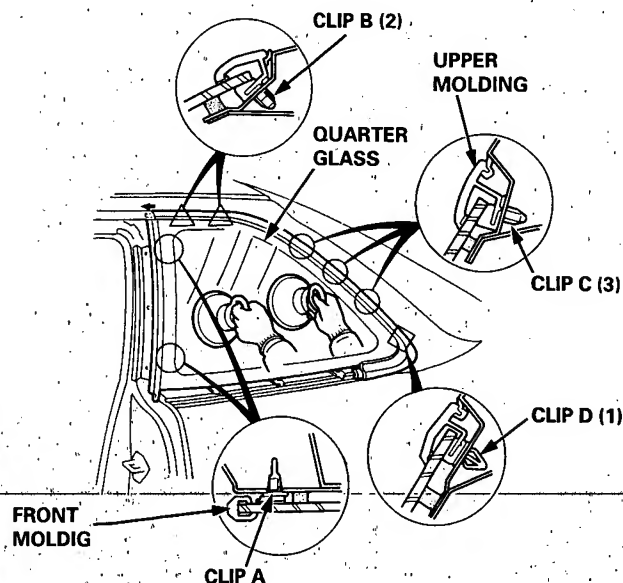
NOTE: Apply the adhesive within thirty after applying the glass primer.

- Pack adhesive into the cartridge without air pockets to ensure continuous delivery. Put the cartridge in a caulking gun and run a bead of adhesive around the edge of the quarter glass as shown.



- Use suction cups to hold the quarter glass over the opening, then set it down on the adhesive. Lightly push on the quarter glass until its edges are fully seated on the adhesive all the way around.

NOTE: Do not open or close the doors until the adhesive is dry.



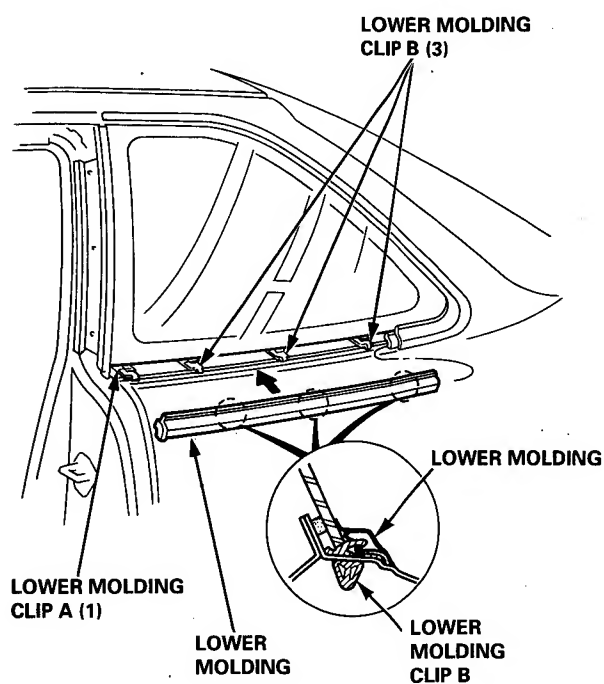




15. Scrape or wipe the excess adhesive off with a putty knife or towel.

NOTE: Use a soft shop towel dampened with alcohol to remove adhesive from a painted surface or quarter glass.

16. Install the lower molding.



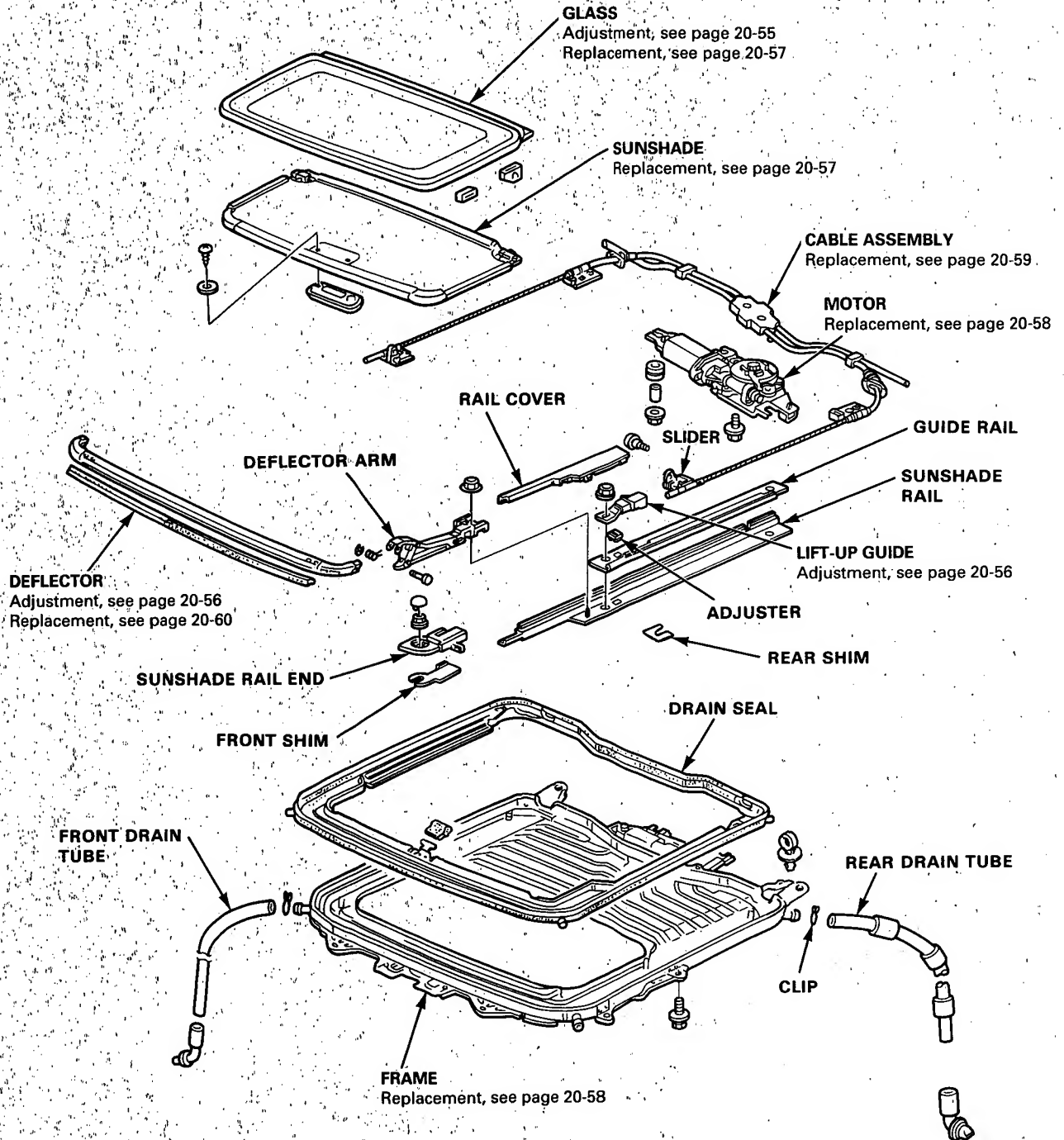
17. Let the adhesive dry for at least one hour, then spray water over the glass and check for leaks. Mark leaking areas and let the glass dry then seal with sealant.

NOTE: Let the car stand for at least four hours after glass installation. If the car has to be used within the first four hours, it must be driven slowly.

18. Reinstall all remaining removed parts.

# Moonroof

## Index





## Troubleshooting

Symptom	Probable Cause
Water leak	<ol style="list-style-type: none"> <li>1. Clogged drain tube.</li> <li>2. Gap between glass weatherstrip and roof panel.</li> <li>3. Defective or improperly installed glass weatherstrip.</li> </ol>
Air leak, wind noise	<ol style="list-style-type: none"> <li>1. Excessive clearance between glass weatherstrip and roof panel.</li> </ol>
Deflector noise	<ol style="list-style-type: none"> <li>1. Improper clearance between deflector seal and roof panel.</li> <li>2. Insufficient deflector extension.</li> <li>3. Deformed deflector.</li> </ol>
Motor noise	<ol style="list-style-type: none"> <li>1. Loose motor.</li> <li>2. Worn gear or bearing.</li> <li>3. Outer cable deformed.</li> </ol>
Glass does not move, but motor turns	<ol style="list-style-type: none"> <li>1. Clutch out of adjustment.</li> <li>2. Foreign matter stuck between guide rail and slider.</li> <li>3. Inner cable loose.</li> <li>4. Outer cable not attached properly.</li> </ol>
Glass does not move and motor does not turn (glass can be moved with moonroof wrench)	<ol style="list-style-type: none"> <li>1. Blown fuse.</li> <li>2. Faulty switch.</li> <li>3. Battery run down.</li> <li>4. Defective motor.</li> </ol>

## Glass Height Adjustment

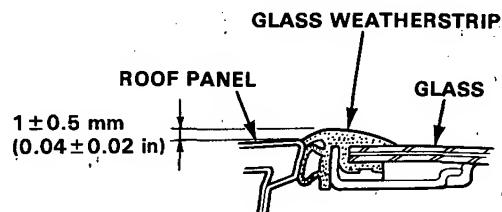
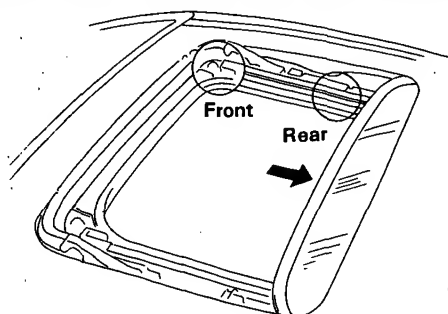
Roof panel should be even with the glass weatherstrip, to within  $1 \pm 0.5$  mm ( $0.04 \pm 0.02$  in) all the way around. If not, open the glass fully, and:

### Front:

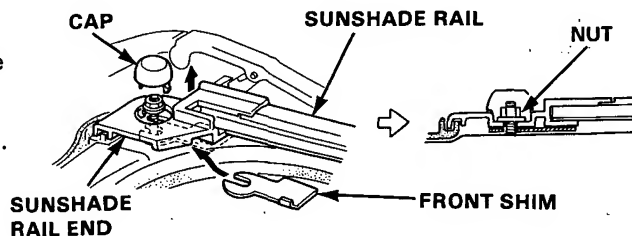
1. Pry out the cap and loosen the nut.
2. Install front shims between frame and sunshade rail end.

### Rear:

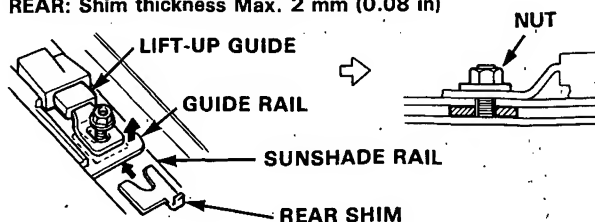
1. Remove the rail cover (see page 20-56) and loosen the nut.
2. Install rear shims between guide rail and sunshade rail.



FRONT: Shim thickness 1 mm (0.04 in) — 3 mm (0.12 in)



REAR: Shim thickness Max. 2 mm (0.08 in)



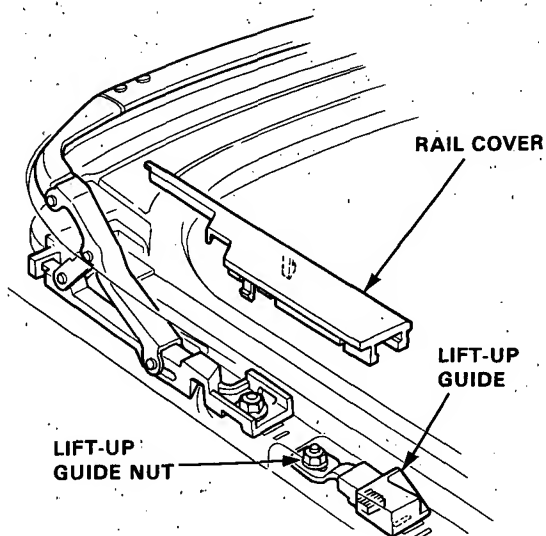
3. Repeat on opposite side if necessary.
4. Side-to-side fit of glass weatherstrip can be adjusted by loosening the frame mounting bolts and moving the frame (see page 20-58).

# Moonroof

## Rear Edge Closing Adjustment

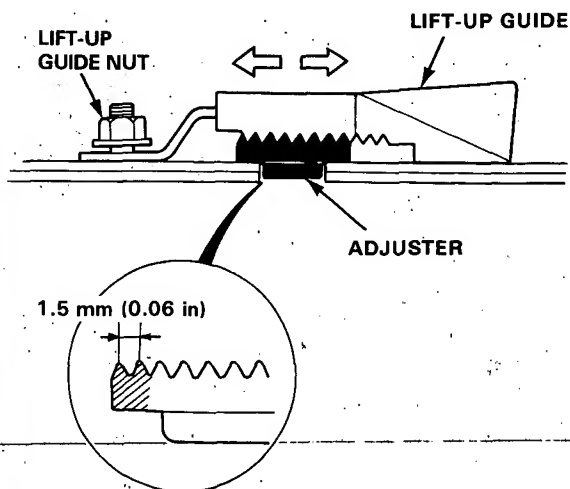
Open the glass about a foot, then close it to check where rear edge begins to rise. If it rises too soon and seats too tightly against the roof panel, or too late and does not seat tightly enough, adjust it.

1. Open the glass fully.
2. Remove the rail covers from both sides, and loosen the lift-up guide nuts.



3. Move the lift-up guides forward or backward, then tighten lift-up guide nuts and recheck glass closing.

The lift-up guides have pitches of 1.5 mm (0.06 in) each and can be adjusted 2 pitches forward or backward.

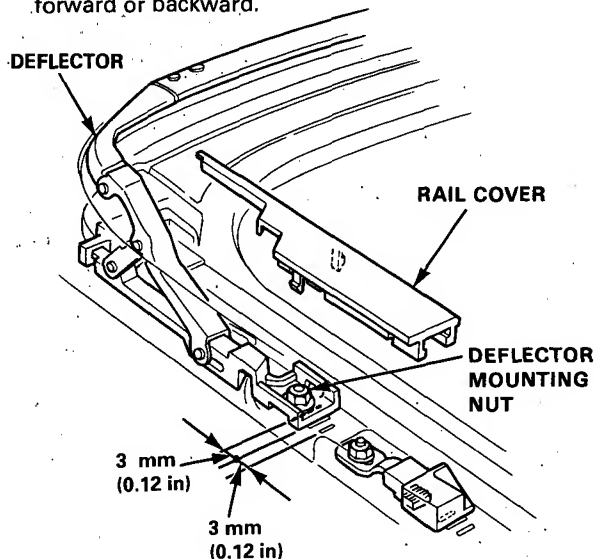


## Deflector Adjustment

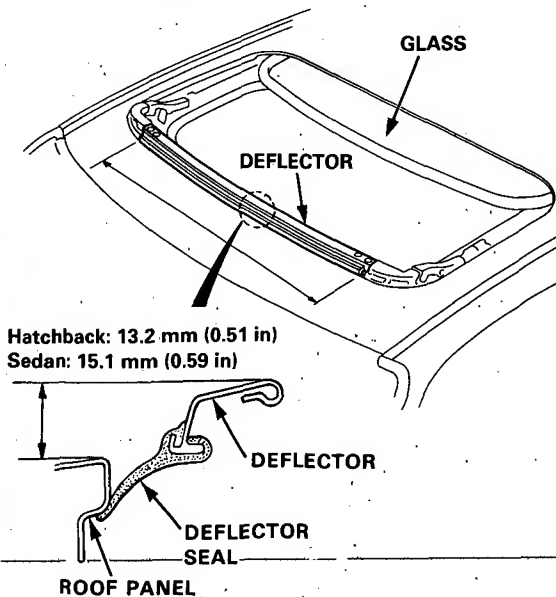
NOTE: A gap between deflector seal and roof panel will cause wind noise when driving at high speed with the glass open.

1. Open the glass and pry the rail covers off both sides.
2. Loosen the deflector mounting nuts.

NOTE: The deflector can be adjusted 3 mm (0.12 in) forward or backward.



3. Adjust the deflector forward or backward so the edge of its seal touches the roof panel evenly. The deflector seal should touch the roof panel across entire front edge.

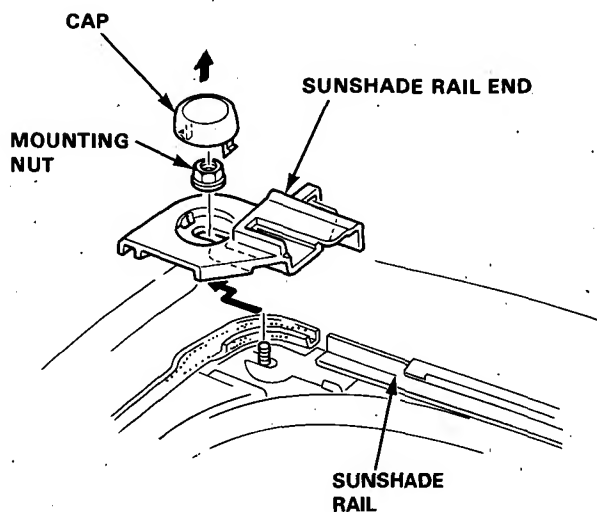


NOTE: The height of the deflector when open cannot be adjusted. If damaged or deformed, replace it (see page 20-60).

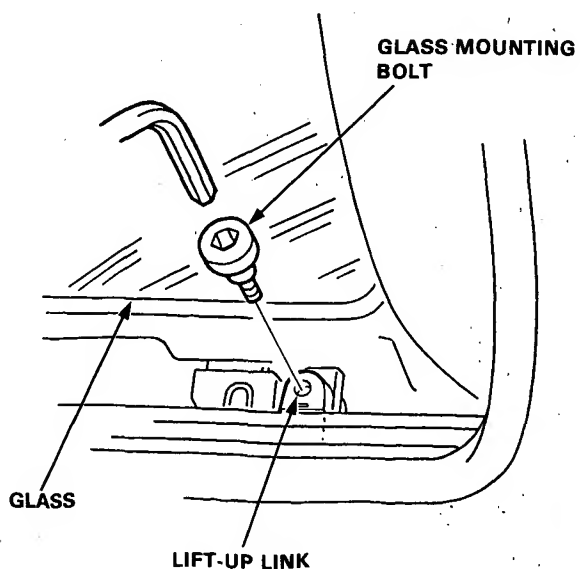


## Glass and Sunshade Replacement

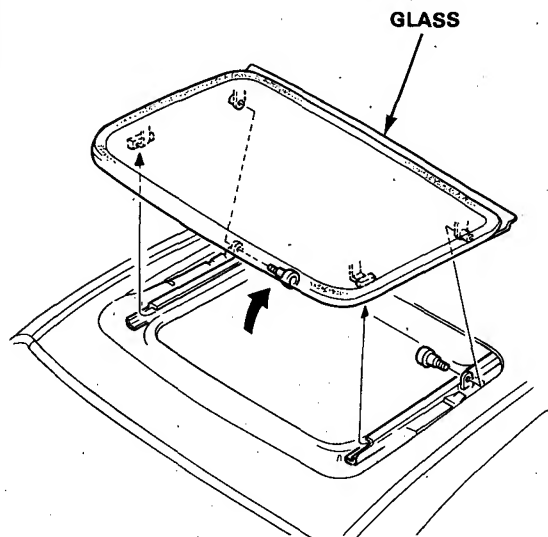
1. Slide the sunshade all the way back.
2. Remove the deflector (see page 20-60).
3. Pry the caps off and remove the mounting nuts on both sides.
4. Slide and lift off the sunshade rail ends on both sides.



5. Close the glass fully.
6. Remove the mounting bolts from the lift-up links on both sides.

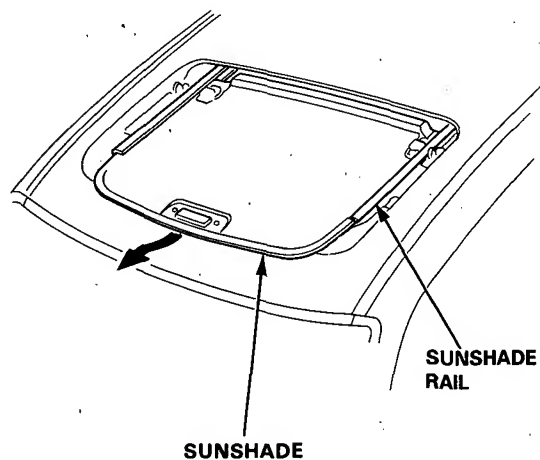


7. Remove the glass by lifting up and pulling forward as shown.



8. Slide the sunshade forward, then remove the sunshade from the sunshade rails.

NOTE: The sunshade may be bent slightly to ease removal.



# 

## 

**CAUTION:** Be careful not to damage the seats or other interior trim.

Remove the glass (see page 20-57) and the headliner (see page 20-63).

Disconnect the motor connector; remove the clips securing the ceiling light wire harness.

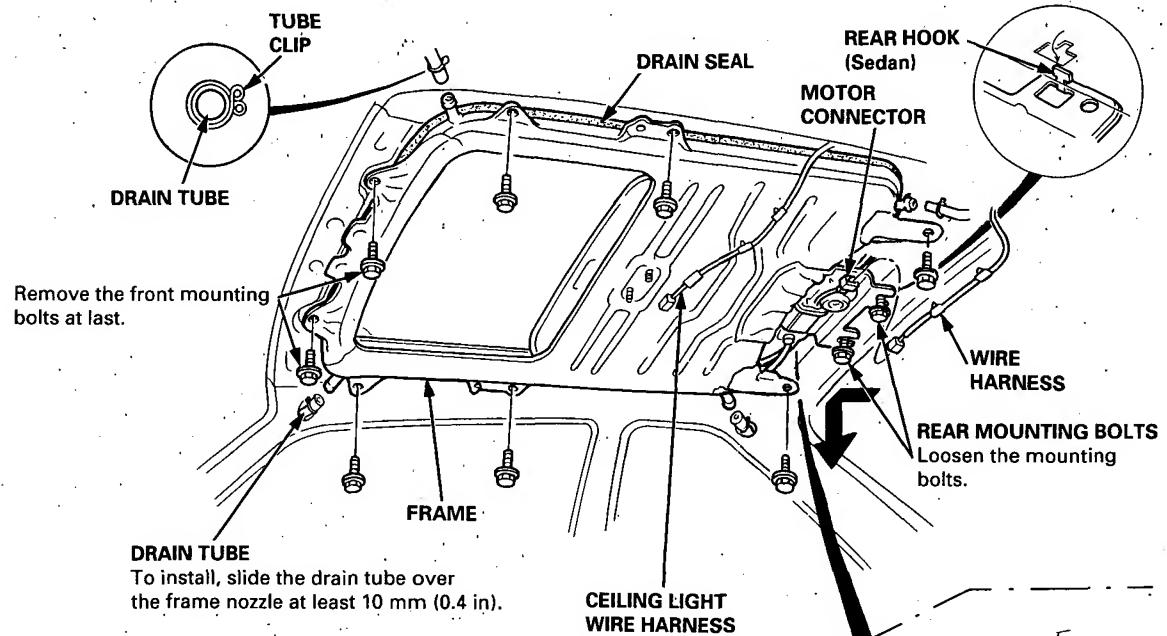
Remove the motor by removing the two bolts and three nuts.

Disconnect the drain tubes.

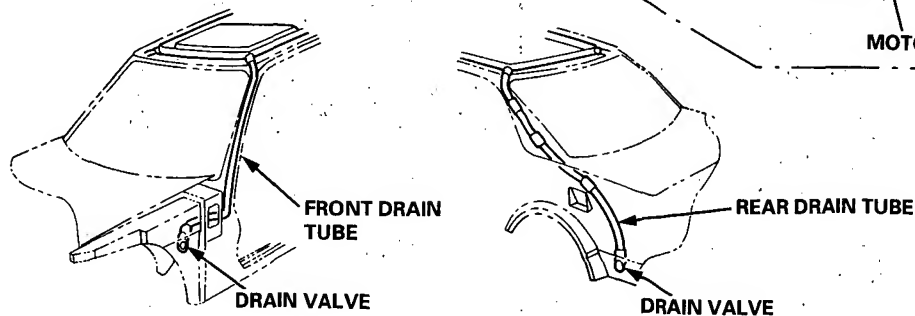
Loosen the two rear mounting bolts.

3. Remove the eight 6 x 16 mm mounting bolts and rear hooks (sedan), then remove the frame from the car.

**NOTE:** You may require assistance when removing the frame.



7. Pull the drain tubes out the front and rear pillars.  
**NOTE:** Before pulling out the drain tube, tie a string to the end of it so it can be reinstalled.



8. To install, insert the frame's rear hooks into the body holes (sedan), then install parts in the reverse order of removal.  
**NOTE:**

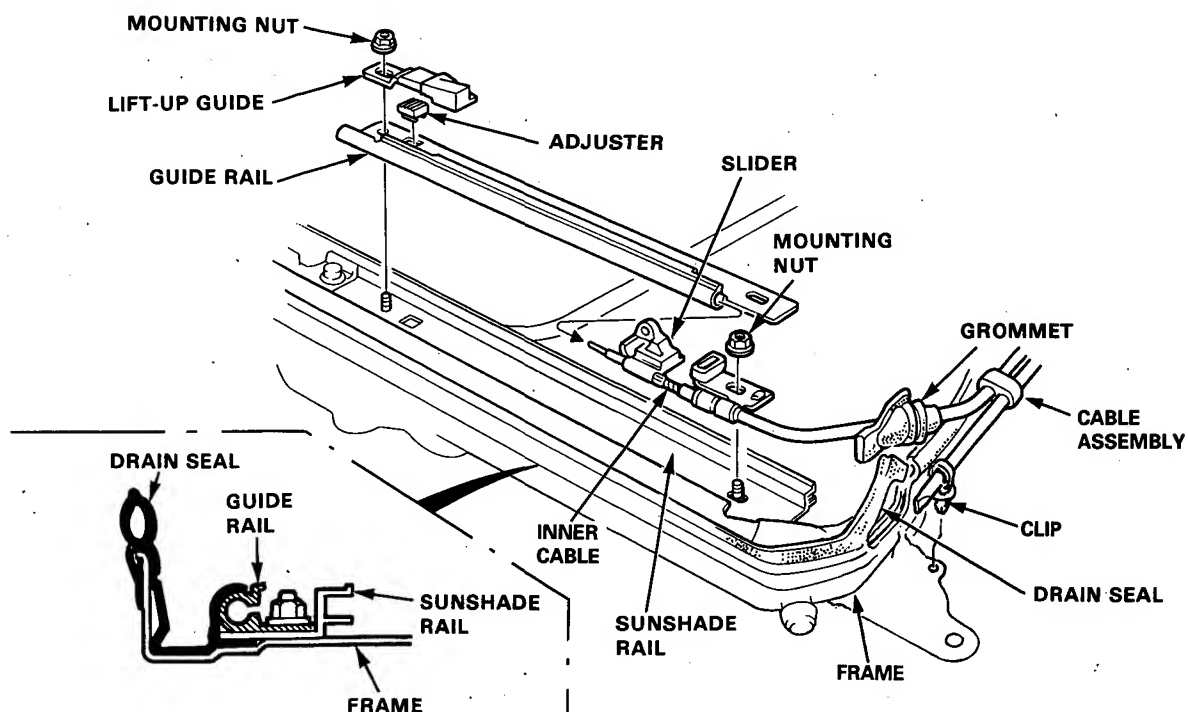
- Install the tube clips with the ends facing the side to ease installation of the headliner.
- Clean the surface of the frame.
- Check the drain seal.
- Check for water leaks.



## Guide Rails/Cable Assembly Replacement

1. With the frame out of the car, remove the motor from the frame (see page 20-58).
2. Remove the guide rail mounting nuts and lift off the guide rails.
3. Remove the cables assembly with sliders attached.
4. If necessary, remove the sunshade rail and drain seal from the frame.

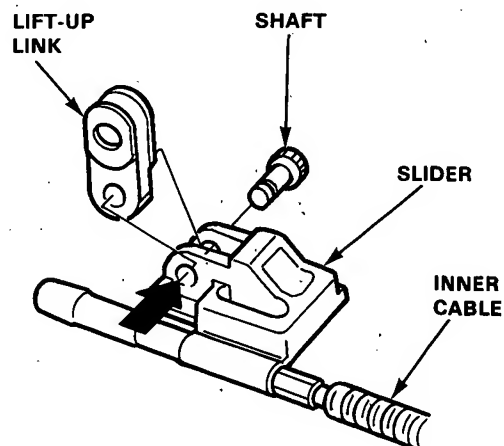
NOTE: Fill the groove in each grommet with sealant and apply molybdenum grease to the inner cable.



## Lift-up Link Disassembly

1. Push out the shaft, and remove the lift-up link from the slider.

NOTE: Replace the shafts with new ones whenever they are disassembled.



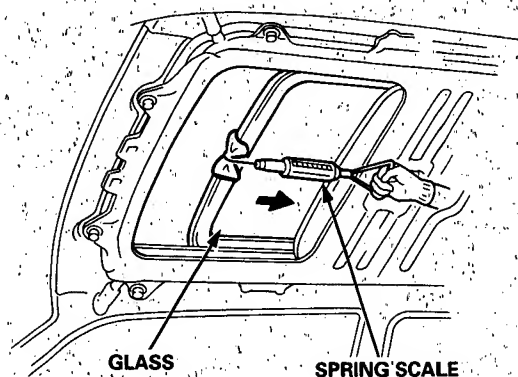
# Moonroof

## Opening Drag Check (Motor Removed)

Before installing the motor, measure effort required to open glass using a spring scale as shown.

**CAUTION:** When using a spring scale, protect the leading edge of the glass with a shop towel.

If load is over 98 N (10 kg, 22 lbs), check side clearance and glass height adjustment (see page 20-55).

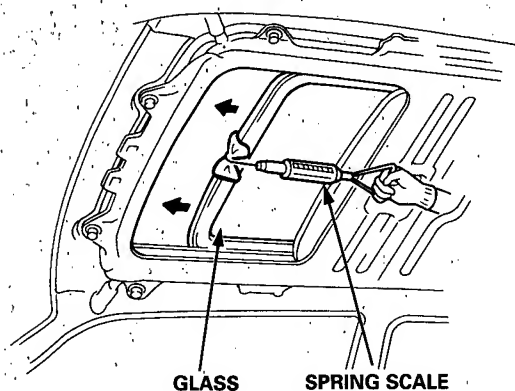


## Closing Force Check (Motor Installed)

1. After installing all removed parts, have a helper hold the switch to close the glass while you measure force required to stop it. Attach spring scale as shown. Read force as soon as glass stops moving, then immediately release the switch and spring scale.

**CAUTION:** When using a spring scale, protect the leading edge of the glass with a shop towel.

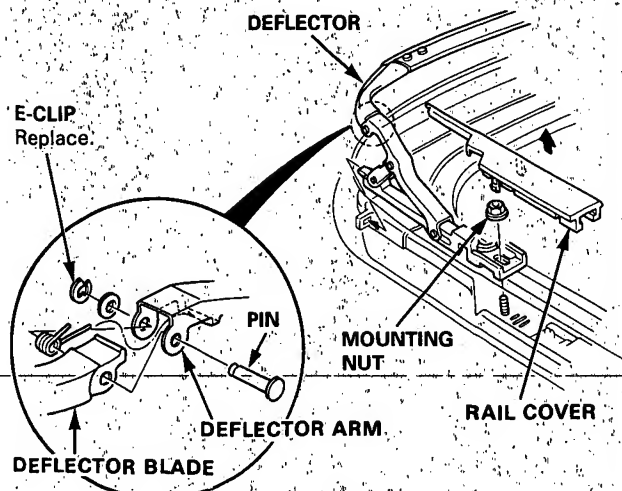
**Closing Force:** 196 — 245 N  
(20 — 30 kg, 44 — 55 lbs)



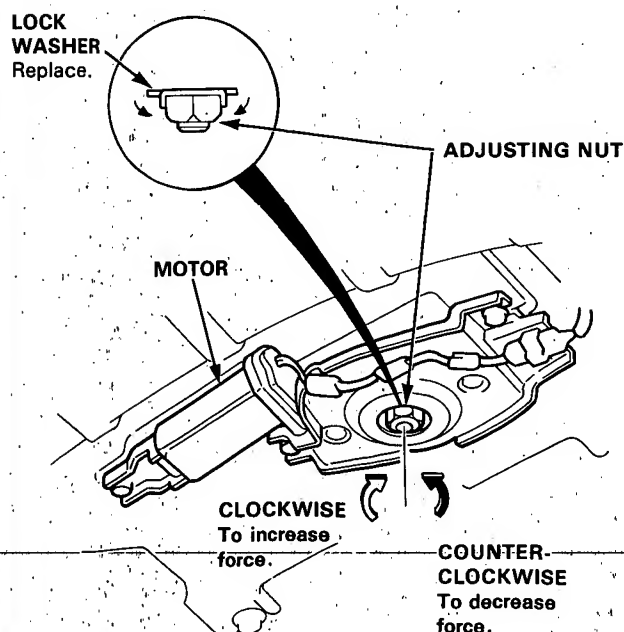
## Deflector Replacement

1. Remove the deflector by removing the rail covers and mounting nuts.
2. Pry the E-clip off the pin, and remove the deflector blade from the deflector arm.
3. Installation sequence is essentially the reverse order of removal.

**NOTE:** Grease all the moving surfaces of the deflector arm.



2. If force is not within specification, install a new lock washer, adjust the tension by turning the motor clutch adjusting nut, and bend the lock washer against the adjusting nut.





# Interior Trim

## Replacement

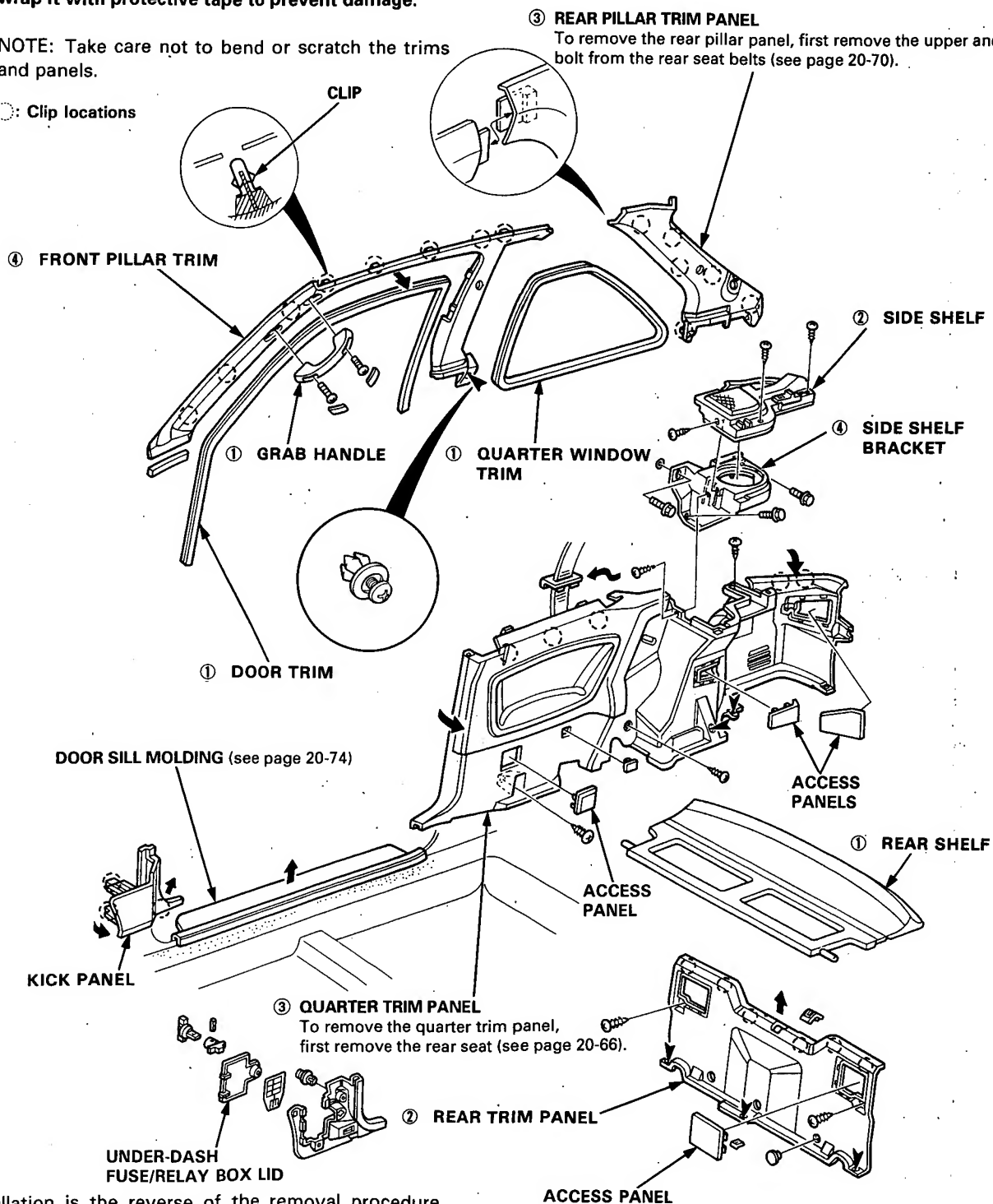
### Hatchback:

Disassemble in numbered sequence.

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

**NOTE:** Take care not to bend or scratch the trims and panels.

○: Clip locations



Installation is the reverse of the removal procedure.

**NOTE:** If necessary, replace any damaged clips.

(cont'd)

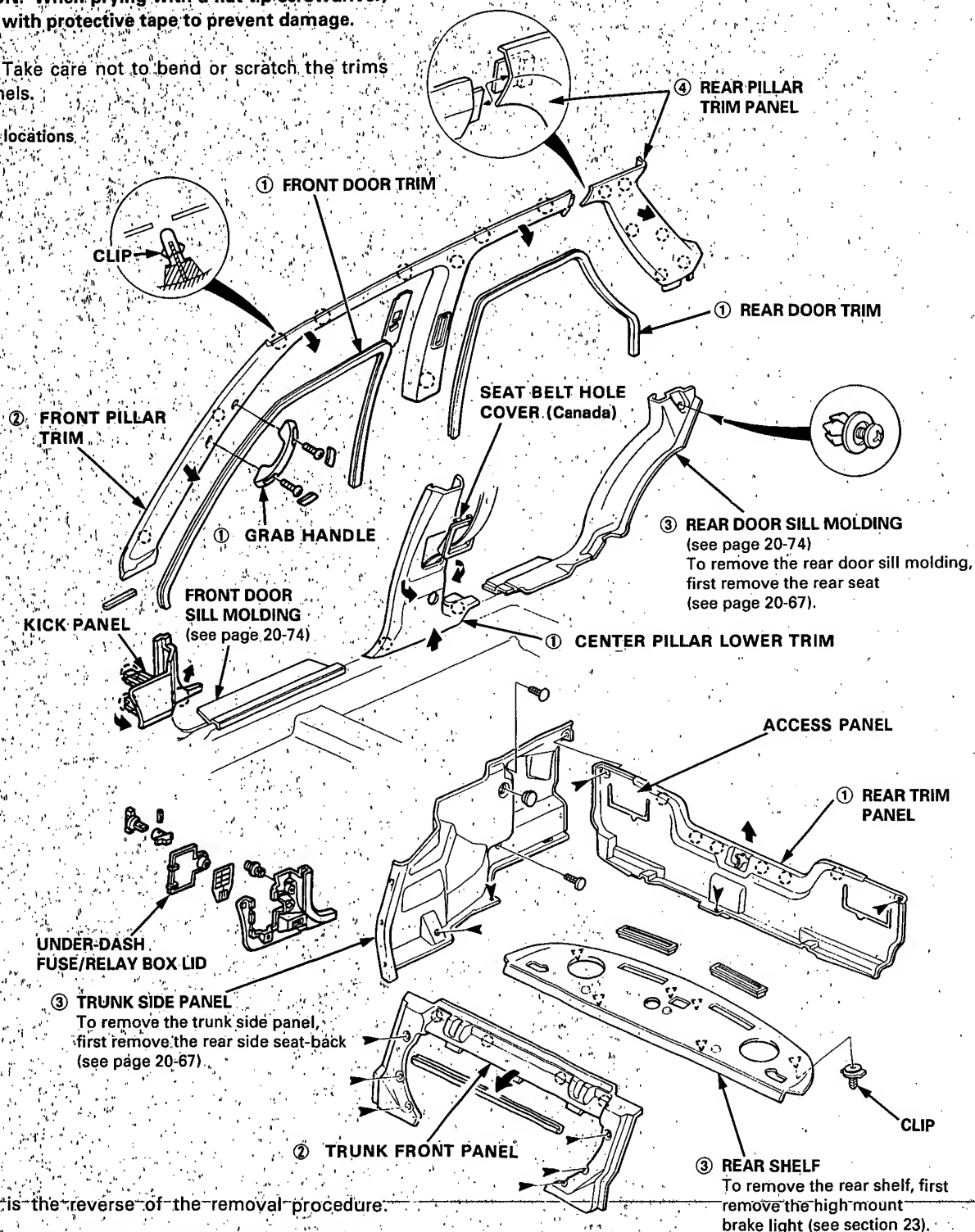
# ior Trim placement (cont'd)

sembly in numbered sequence.

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

**NOTE:** Take care not to bend or scratch the trims and panels.

○ Clip locations



Installation is the reverse of the removal procedure.

**NOTE:** If necessary, replace any damaged clips.

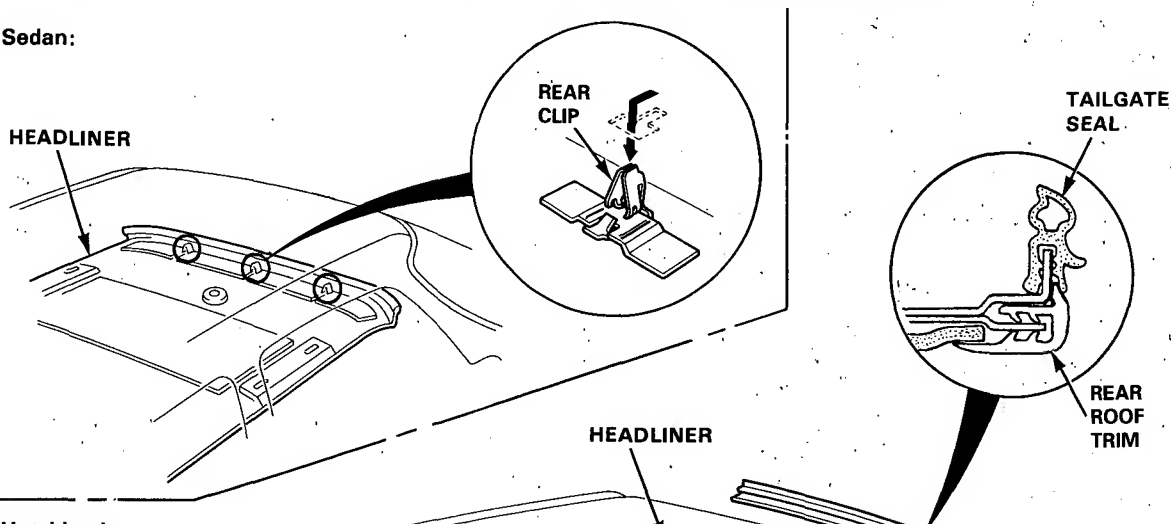
# Headliner



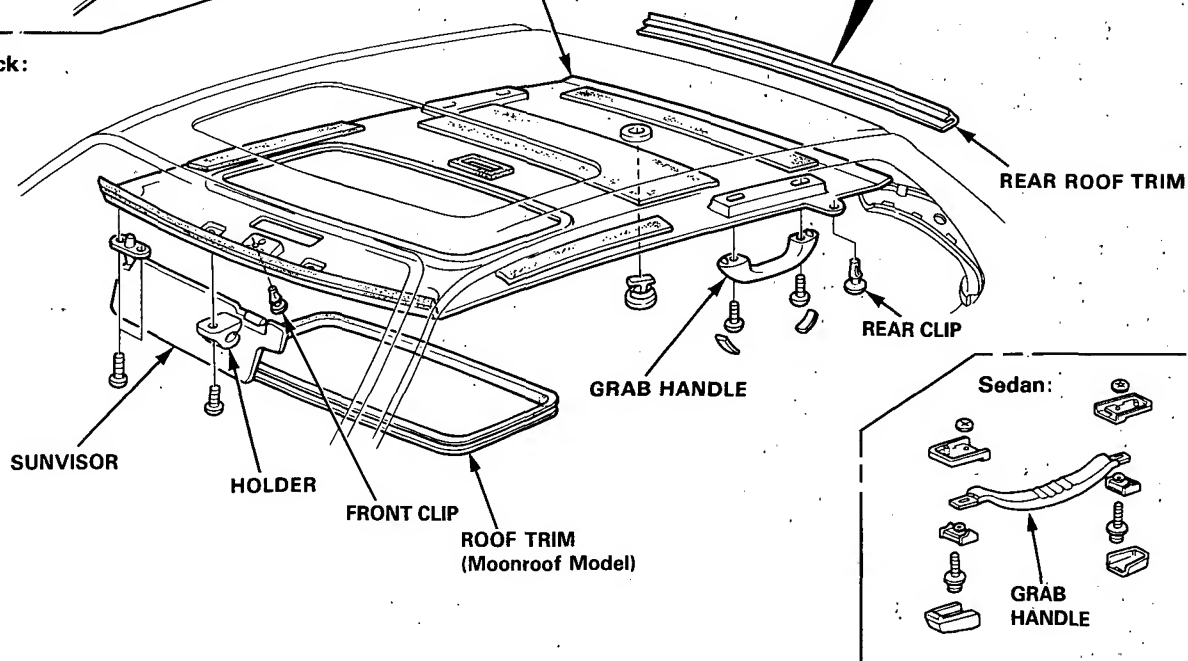
## Replacement

1. Remove:
  - Sunvisors and holders
  - Front map light and ceiling light (see section 23)
  - Rearview mirror (see page 20-72)
  - Front pillar trims (see pages 20-61, 62)
  - Rear pillar trim panels  
Sedan (see page 20-62)  
Hatchback (see page 20-61)
  - Roof trim (Moonroof model)
  - Grab handles
2. Remove the rear clips (sedan) and rear roof trim (hatchback), then remove the headliner.

**Sedan:**



**Hatchback:**



3. Installation is the reverse of the removal procedure.

### NOTE:

- When inserting the headliner through the door opening, be careful not to fold or bend it. Also, be careful not to scratch the body.
- Check that both sides of the headliner are securely attached to the trim.

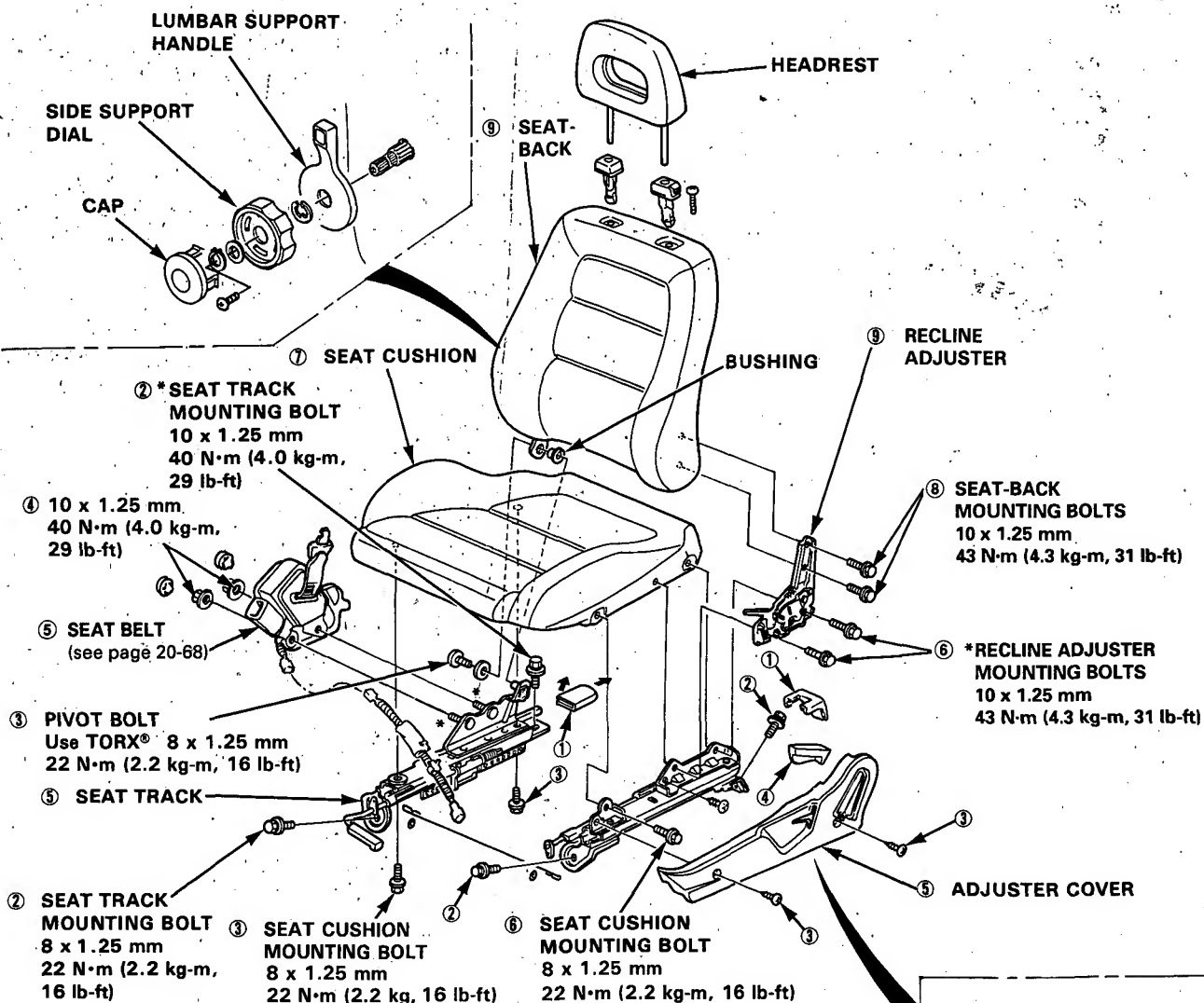
# Front Seats

## Disassembly

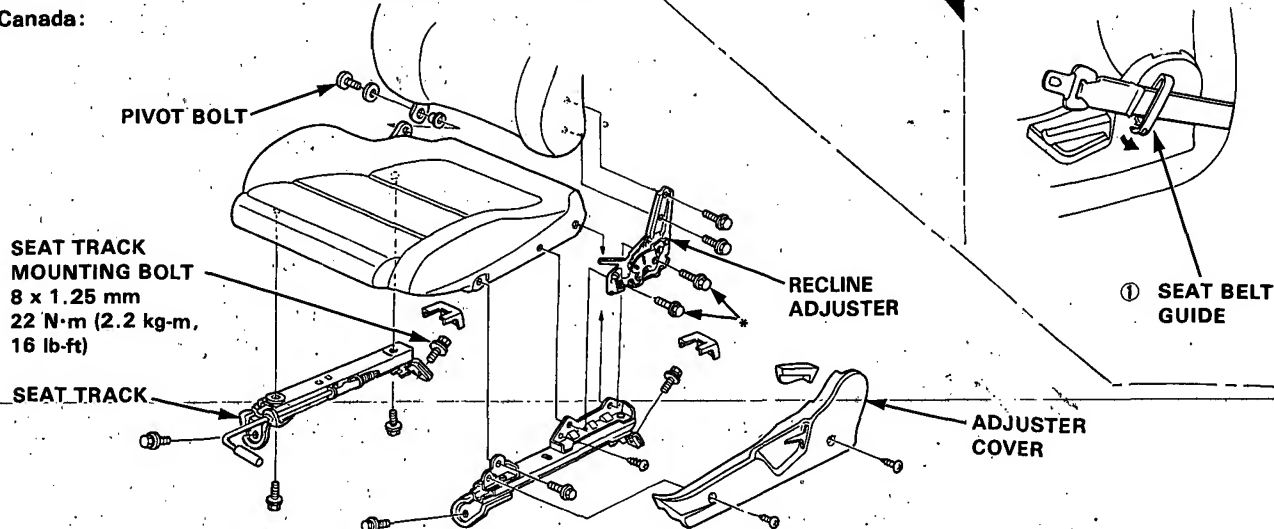
(Driver's)

Disassemble in numbered sequence.

NOTE: On reassembly, replace the mounting bolts (\*) and use liquid thread lock.



Canada:



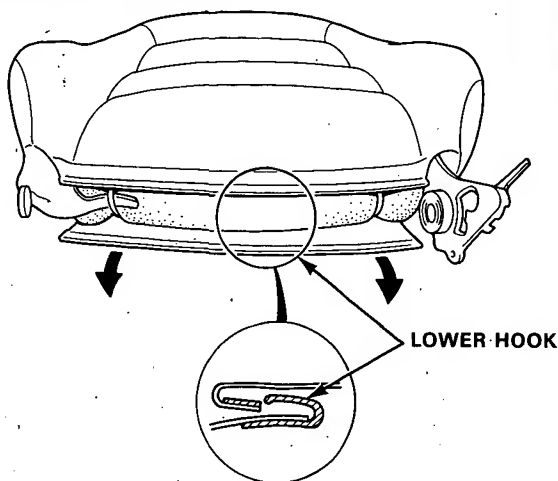
# Front Seat Cover



## Replacement

### Seat-back cover removal:

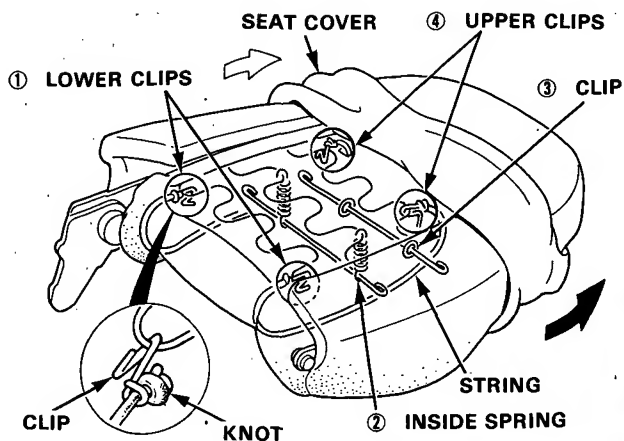
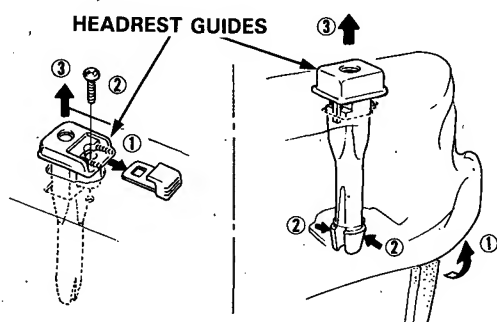
1. Separate the seat-back from the seat cushion (see page 20-64).
2. Remove the lower hook.



3. Turn the forward edge of the seat cover up to expose the lower clips at the ends of the retaining strings. Turn over the seat cover by releasing the inside springs and upper clips.

**NOTE:** Take care not to open the seams or damage the cover.

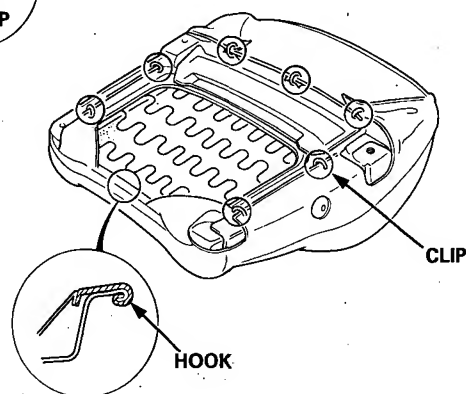
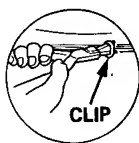
4. Remove the headrest guides, then remove the seat cover.



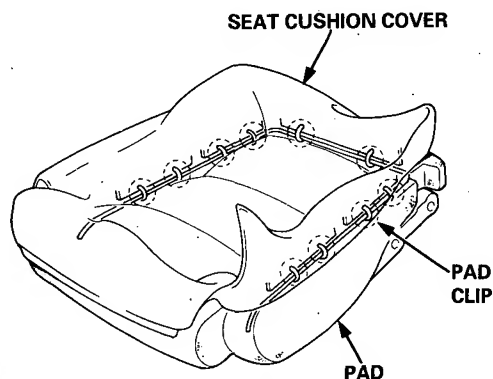
### Seat cushion cover removal:

1. Separate the seat cushion from the seat-back (see page 20-64).
2. Remove all clips and hook from under the seat cushion.

### Clip removal:



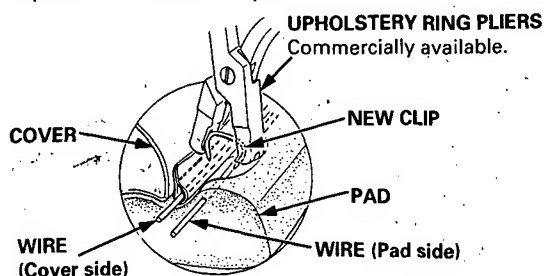
3. Turn up the edge of the trim cover all the way around, then release the pad clips of the cushion.



4. Installation is the reverse of the removal procedure.

### NOTE:

- To prevent wrinkles when installing a seat cover, make sure the material is stretched evenly over the frame before securing all the clips.
- Replace the released clips.



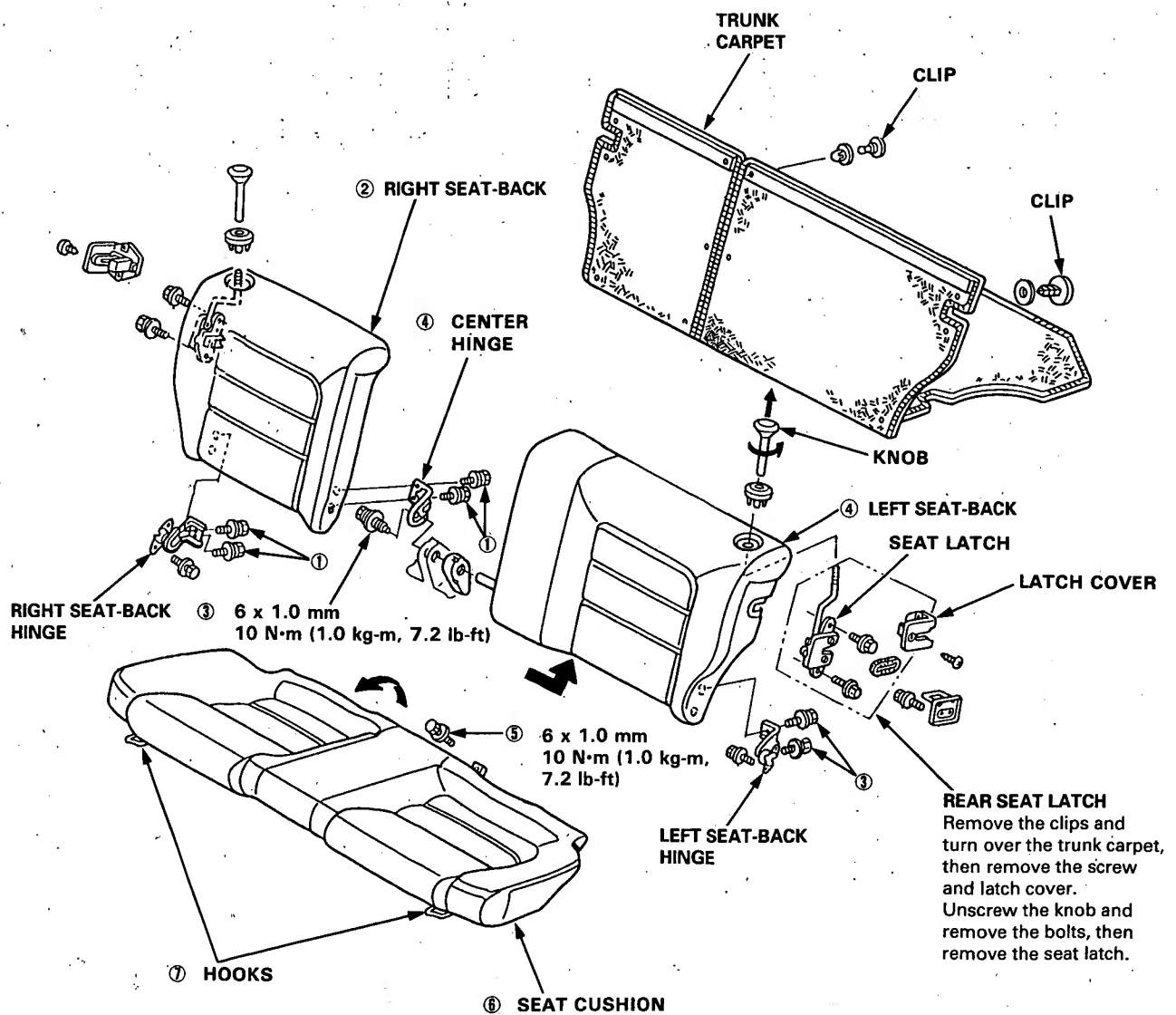
# Rear Seats

## Replacement

### Hatchback:

Disassemble in numbered sequence.

NOTE: Take care not to split the seams or damage the cover.



Installation is the reverse of the removal procedure.

### NOTE:

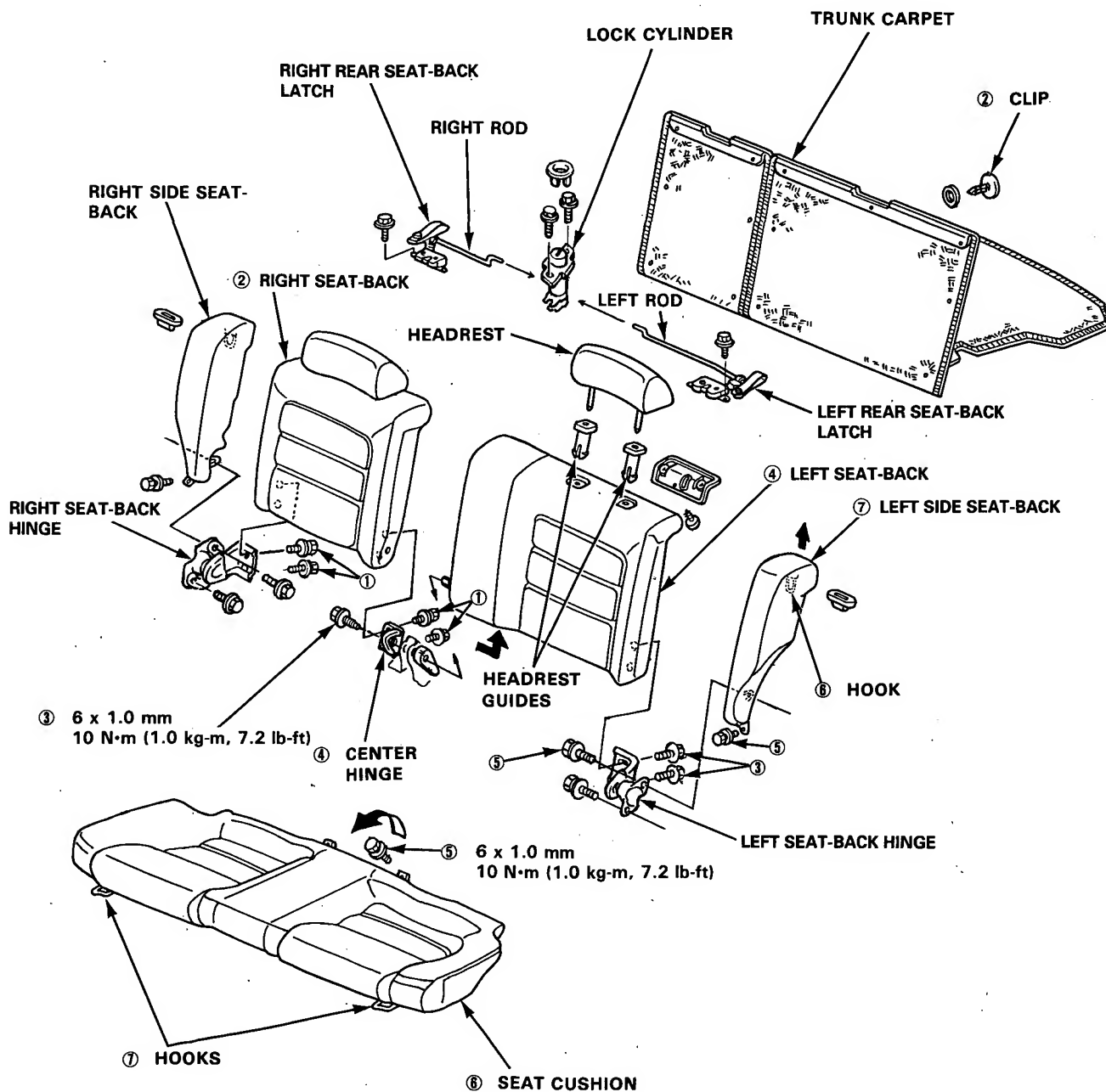
- Before attaching the seat-back and seat cushion, make sure there are no twists in the seat belt.
- When installing the seat cushion, position the seat belts correctly.



**Sedan:**

Disassemble in numbered sequence.

NOTE: Take care not to split the seams or damage the cover.



Installation is the reverse of the removal procedure.

**NOTE:**

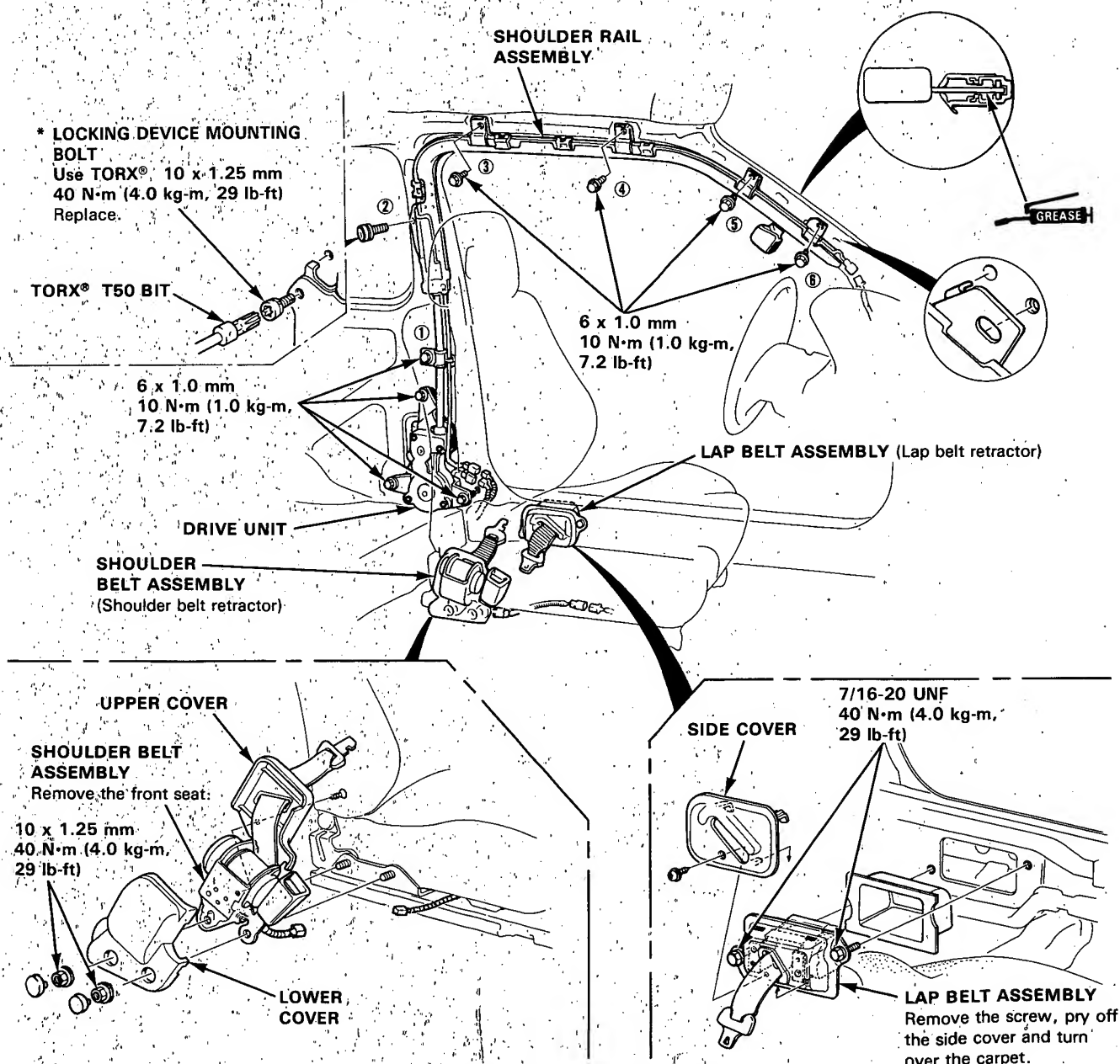
- Before attaching the seat-back and seat cushion, make sure there are no twists in the seat belt.
- When installing the seat cushion, position the seat belts correctly.

# Seat Belts

## Front Replacement (USA)

**CAUTION:** Check the seat belt system for proper function (see section 23); check the belts for damage and replace them if necessary. Be careful not to damage them during removal and installation.

1. Remove:
  - Hatchback: Front pillar trim and quarter trim panel (see page 20-61).
  - Sedan: Center pillar lower trim and front pillar trim (see page 20-62).
2. Remove the mounting bolts and disconnect the connectors, then remove the shoulder rail assembly.



3. Check that the retractor locking mechanism functions as described on page 20-71.

4. Installation is the reverse of the removal procedure.

### NOTE:

- Tighten the shoulder rail mounting bolts in the sequence shown.
- On reassembly, replace the Torx® bolt (\*) and use liquid thread lock.
- Check the function of the shoulder buckle by manually operating the buckle with the tool supplied with the car.





## Front Replacement (Canada)

**CAUTION:** Check the seat belts for damage and replace them if necessary. Be careful not to damage them during removal and installation.

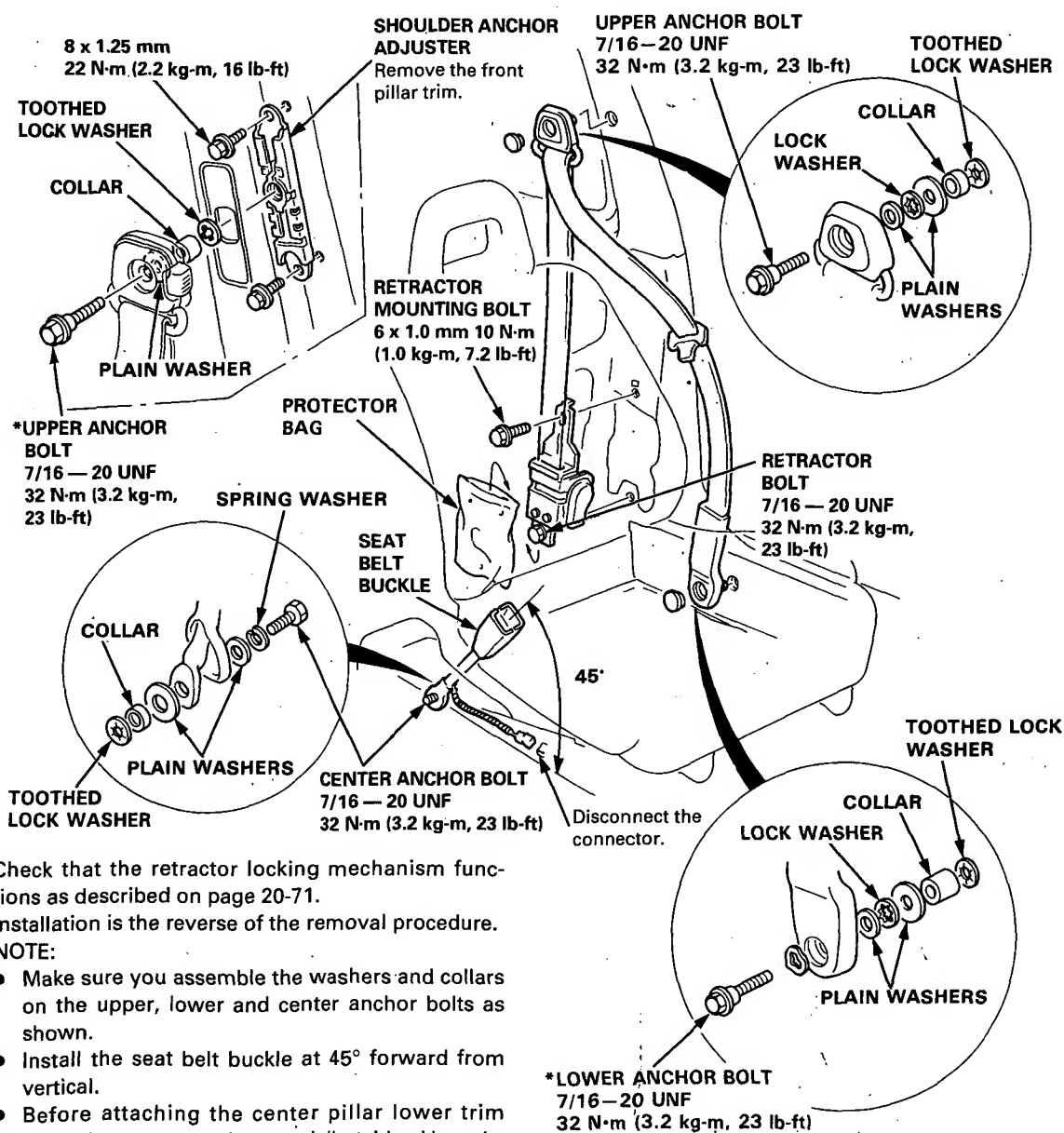
1. Remove:

- Hatchback: Quarter trim panel (see page 20-61)
- Sedan: Center pillar lower trim (see page 20-62)

2. Remove the all three anchor bolts, retractor bolt and retractor mounting bolt, then remove the seat belt and seat belt buckle.

**NOTE:** When removing the anchor bolts and retractor bolt, use a 17 mm socket or box-end wrench.

**Sedan:**



3. Check that the retractor locking mechanism functions as described on page 20-71.

4. Installation is the reverse of the removal procedure.

**NOTE:**

- Make sure you assemble the washers and collars on the upper, lower and center anchor bolts as shown.
- Install the seat belt buckle at 45° forward from vertical.
- Before attaching the center pillar lower trim (sedan) or quarter trim panel (hatchback), make sure there are no twists or kinks in the belts.
- On reassembly, replace the anchor bolts (\*) and use liquid thread lock.

# Seat Belts

## Rear Replacement

**CAUTION:** Check the seat belts for damage and replace them if necessary. Be careful not to damage them during removal and installation.

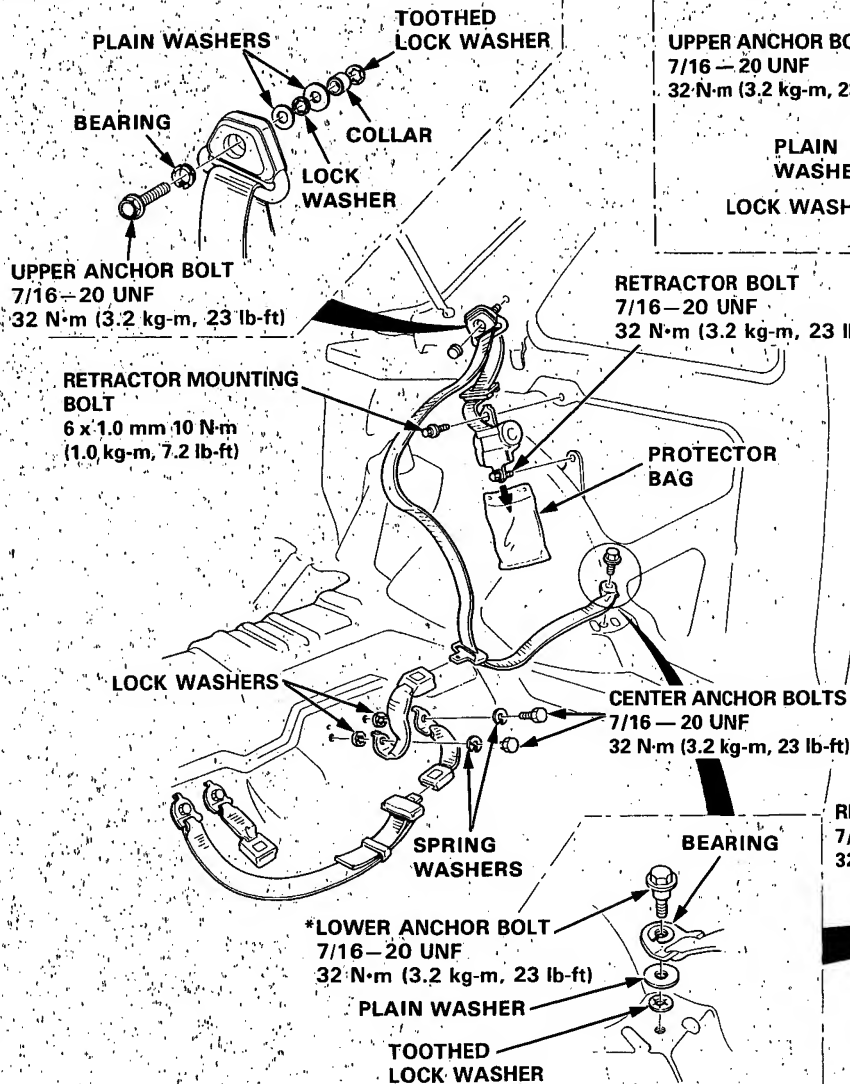
### 1. Remove:

- Hatchback: Rear seat (see page 20-66) and quarter trim panel (see page 20-61)
- Sedan: Rear seat (see page 20-67) and rear shelf/trunk side panel (see page 20-62)

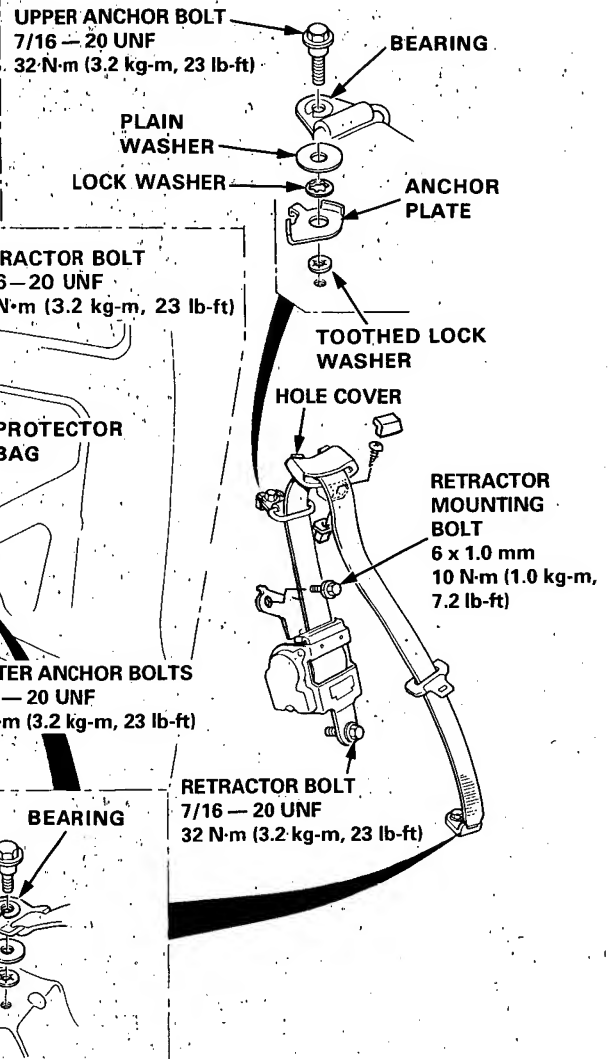
### 2. Remove the all anchor bolts, retractor bolt and retractor mounting bolt, then remove the seat belts.

**NOTE:** When removing the anchor bolts and retractor bolt, use a 17 mm socket or box-end wrench.

#### Hatchback:



#### Sedan:



### 3. Check the retractor locking mechanism functions as described on page 20-71.

### 4. Installation is the reverse of the removal procedure.

#### NOTE:

- Before attaching the quarter trim panel (hatchback) or rear shelf (sedan) and rear seat, make sure there are no twists in the belt.
- Pass the seat belts through the seat belt guides of the seat cushion.
- On reassembly, replace the lower anchor bolt (\*) and use liquid thread lock.



## Inspection

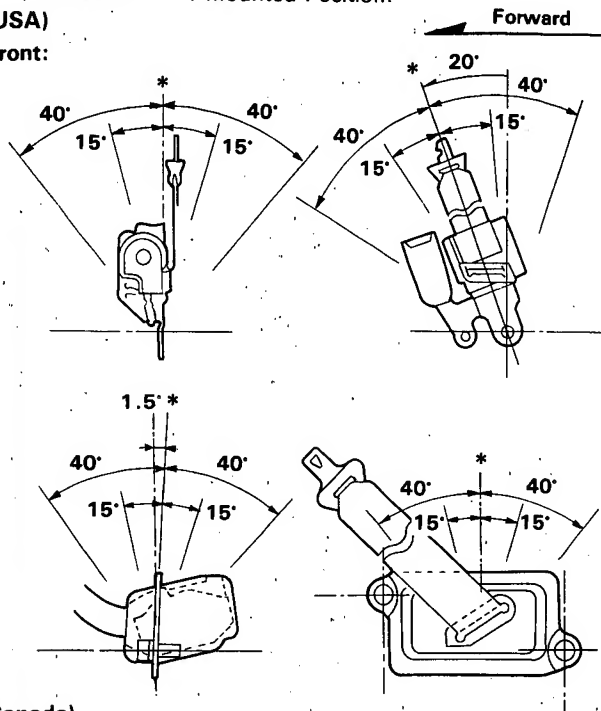
### Retractor Inspection

1. Before installing the retractor, check that the seat belt can be pulled out freely.
2. Make sure that the seat belt does not lock when the retractor is leaned slowly up to 15° from the mounted position. The seat belt should lock when the retractor is leaned over 40°

**CAUTION:** Do not attempt to disassemble the retractor. \*: Mounted Position.

(USA)

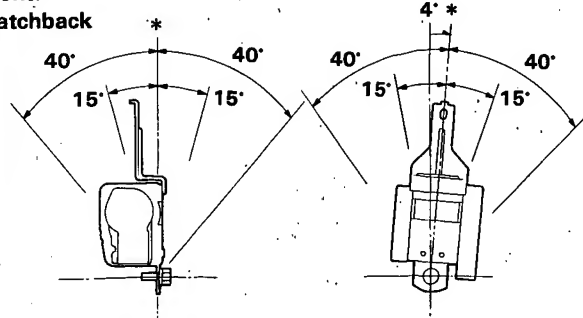
Front:



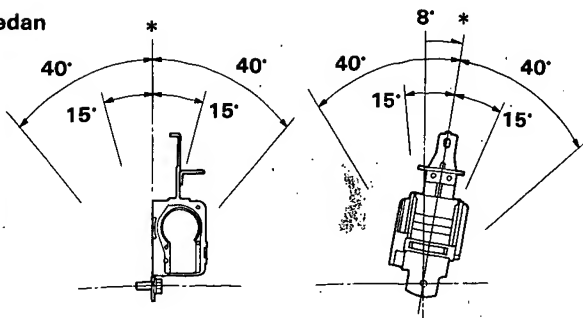
(Canada)

Front:

Hatchback

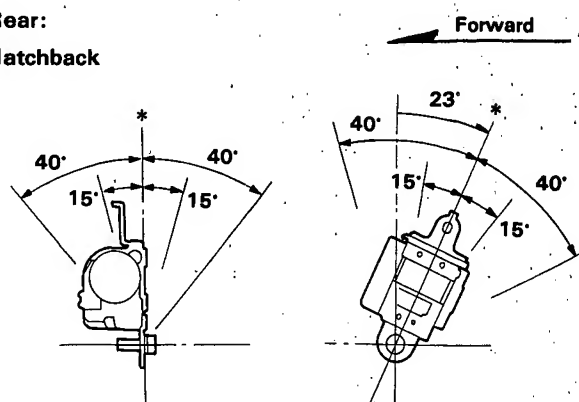


Sedan

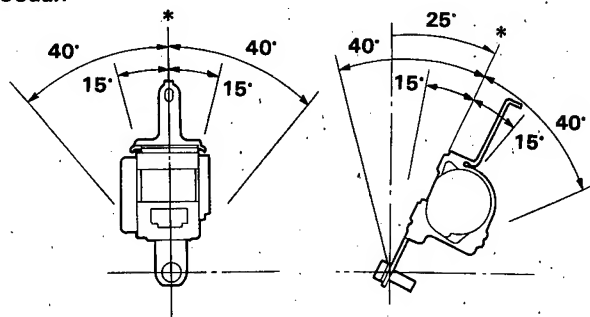


Rear:

Hatchback



Sedan



3. Replace the seat belt with a new one if there is any abnormality.

### On-the-Car Seat Belt Inspection

1. Check that the seat belt is not twisted or caught on anything.
2. After installing the anchors, check for free movement on its retaining bolt. If necessary, remove the anchor bolt and check that the washers and other parts are not damaged or improperly installed.
3. Check the seat belts for damage or discoloration. Clean with a shop towel if necessary.

**CAUTION:** Use only soap and water to clean.

**NOTE:** Dirt build-up in the metal loops of the seat belt anchors can cause belts to retract slowly. Wipe the inside of the loops with a clean cloth dampened in isopropyl alcohol.

4. Check that the seat belt does not lock when pulled out slowly. The seat belt is designed to lock only during a sudden stop or impact.
5. Make sure that the seat belt will retract automatically when released.
6. Replace the seat belt with a new one if there is any abnormality.

## Seat Belts

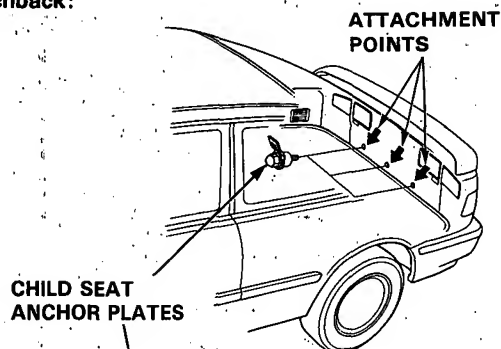
### Child Seat Anchor Plate

Attachment points are provided for a rear seat mounted child restraint system which uses a top tether.

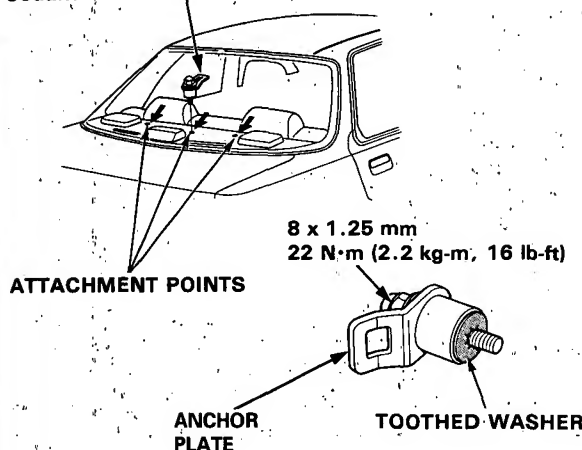
The tether attachment points are located on the rear panel (hatchback) or the rear shelf (sedan), just behind the rear seat-back.

When using a child seat with a top tether, remove the plug cover from the attachment points and install the child seat anchor plate securely.

#### Hatchback:



#### Sedan:



#### NOTE:

- Do not remove the toothed washer from the child seat anchor plate. Use the child seat anchor plate with the toothed washer attached to it.
- When installing a child seat on the rear seat, follow the instructions of the manufacturer of the child seat.
- Additional anchor plates are available.

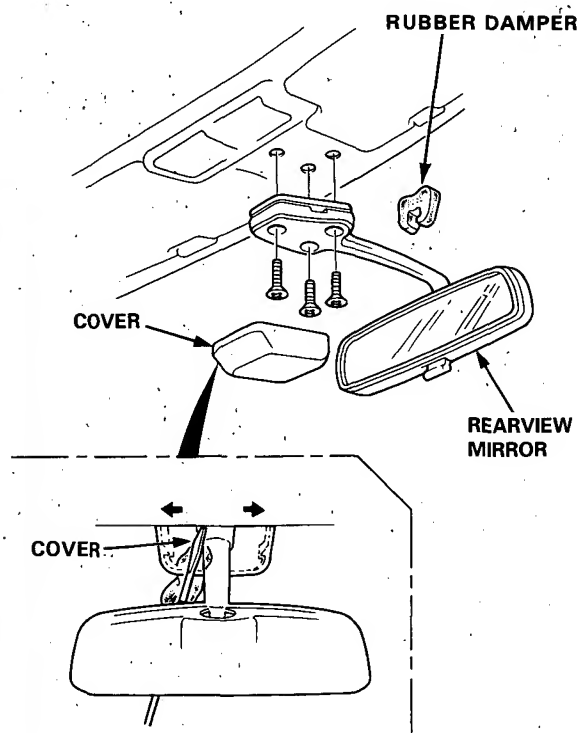
#### WARNING

- Do not use the anchor plate for any other purpose; it is designed exclusively for installation of a child seat.
- Make sure the rear seat-back is locked firmly when installing a child seat.
- On a Hatchback, install the child seat to either the right or left side attachment point if the top tether strap cannot be properly tensioned when using the center attachment point.

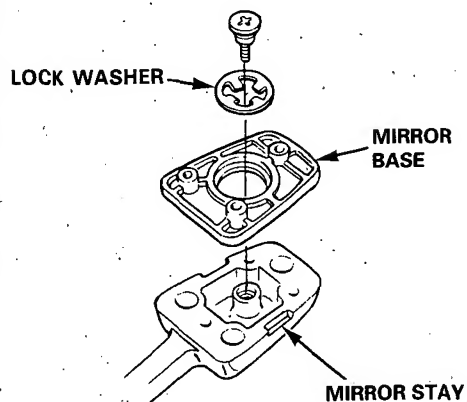
## Rearview Mirror

### Replacement

1. Remove the rubber damper.
2. Pry the cover off using the end of a flat tip screwdriver.  
**CAUTION:** To prevent damage to the mirror and cover, wrap the end of the screwdriver with a shop towel.
3. Remove the mounting screws from the mirror base, then remove the rearview mirror.



4. Remove the mirror base from the mirror stay by removing the screw.



5. Installation is the reverse of the removal procedure.

# Console



## Replacement

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

**NOTE:**

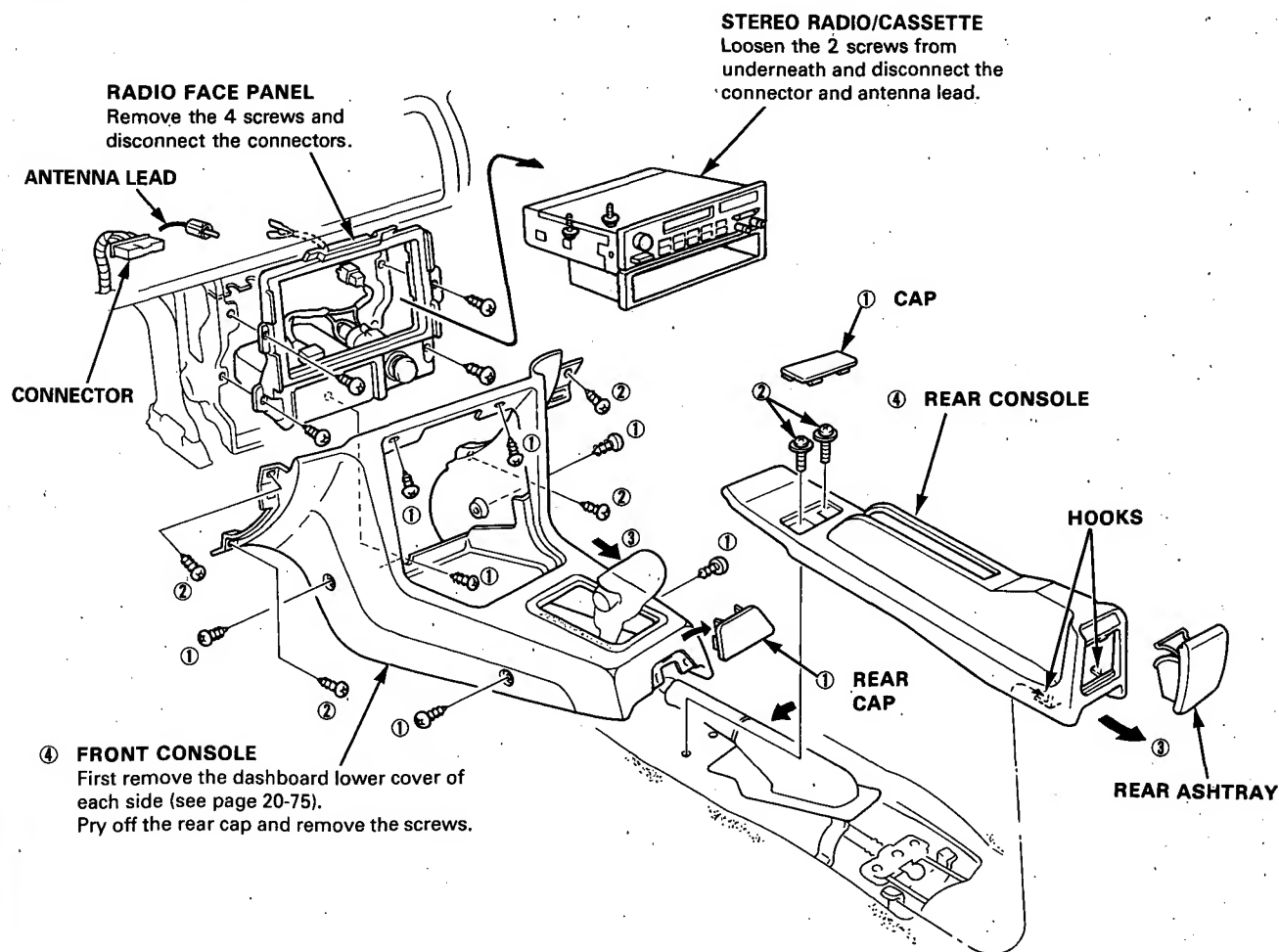
- The radio may have a coded theft protection circuit. Be sure to get the customer's code number before
  - Disconnecting the battery.
  - Removing the No. 14 (15 A) fuse.
  - Removing the radio.

After service, reconnect power to the radio and turn it on.

When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

- Take care not to scratch the consoles and dashboard.
- For A/T models, shift lever to drive position.
- For M/T models, remove the shift lever knob.

Disassemble in numbered sequence.



Installation is the reverse of the removal procedure.

# Carpet/Door Sill Moldings

## Replacement

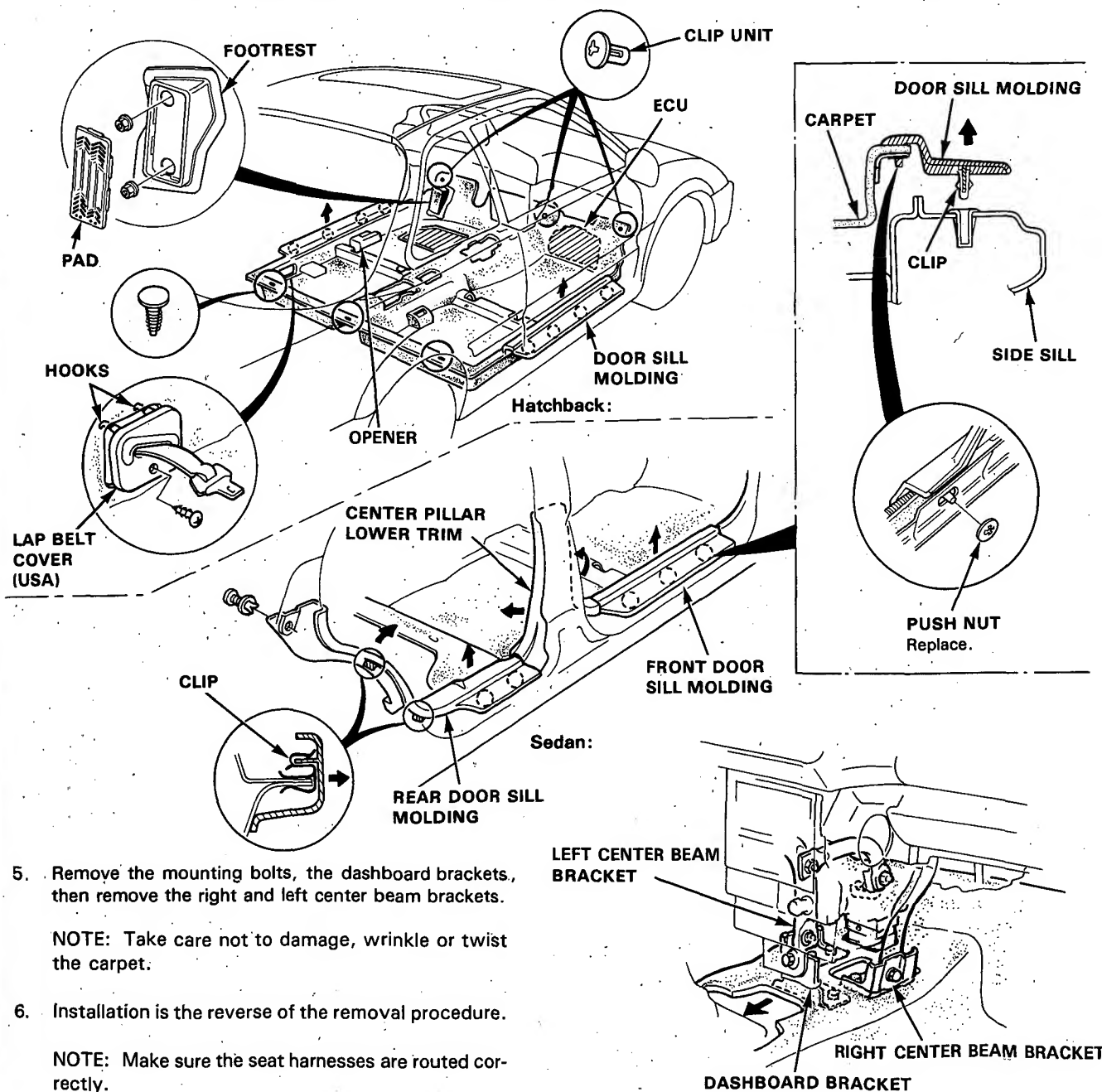
### 1. Remove:

- Front seats (see page 20-64)
- Rear seat (see pages 20-66, 67)
- Consoles (see page 20-73)
- Openers (see page 20-84)
- Canada: Front seat belt lower anchor and center anchor bolts (see page 20-69)
- Hatchback: Front of quarter trim panels (see page 20-61)
- Sedan: Center pillar lower trim (see page 20-62)
- Kick panels (see pages 20-61, 62)
- Footrest

### 2. Pry out the clips and pull up the door sill moldings.

### 3. Remove the push nuts; then separate the door sill moldings and carpet.

### 4. Pry out the clips at the rear edge and under the dashboard, peel off the tape and remove the clip nuts.



# Dashboard



## Component Removal/Installation

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

**NOTE:**

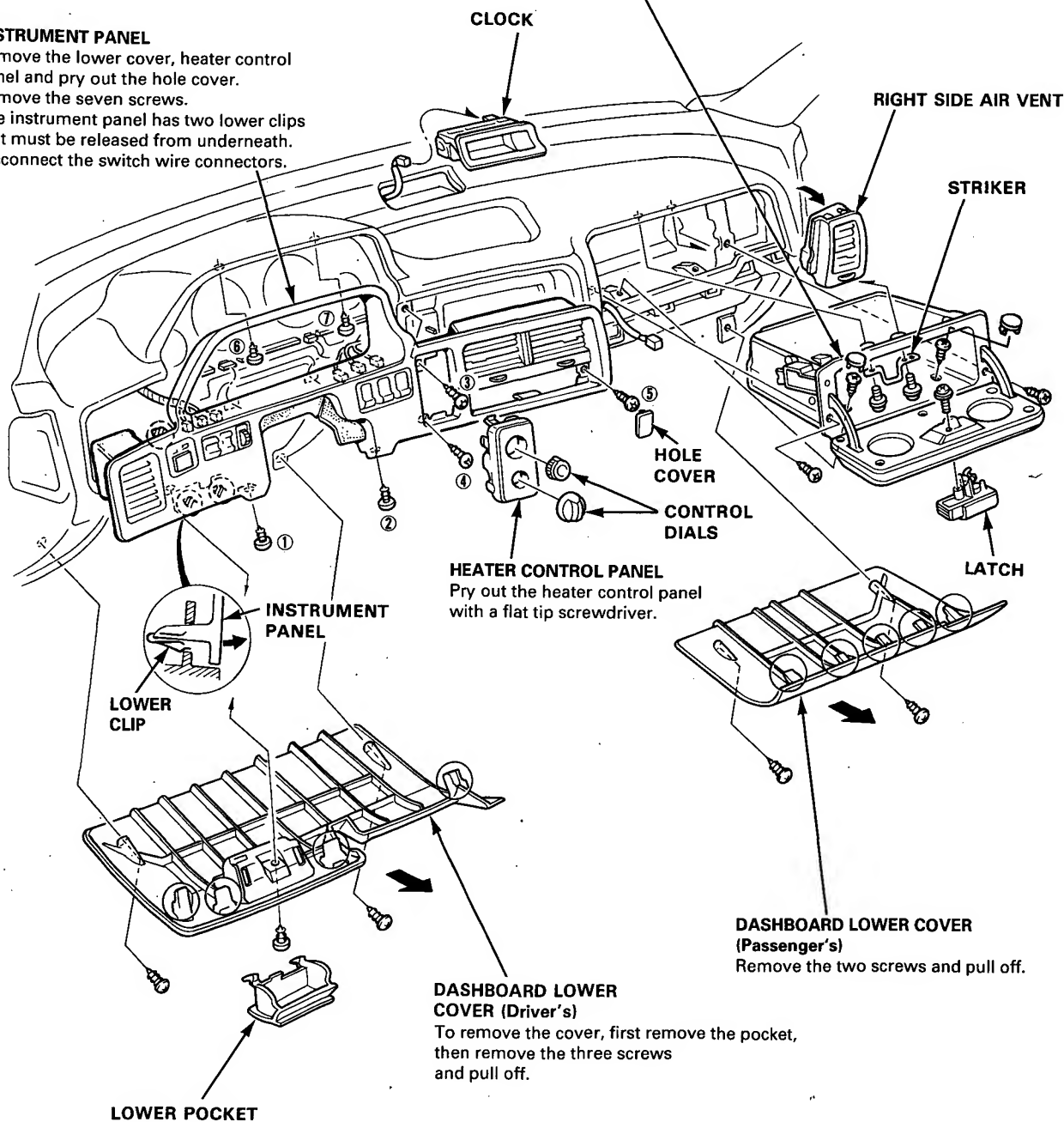
- Take care not to scratch the dashboard and other parts.
- Do not drop the screws inside the dashboard.

### INSTRUMENT PANEL

Remove the lower cover, heater control panel and pry out the hole cover. Remove the seven screws. The instrument panel has two lower clips that must be released from underneath. Disconnect the switch wire connectors.

### GLOVE BOX

To remove glove box, remove the six screws, striker and disconnect the glove box light wire connector.



Installation is the reverse of the removal procedure.

**NOTE:** Take care not to scratch the dashboard.

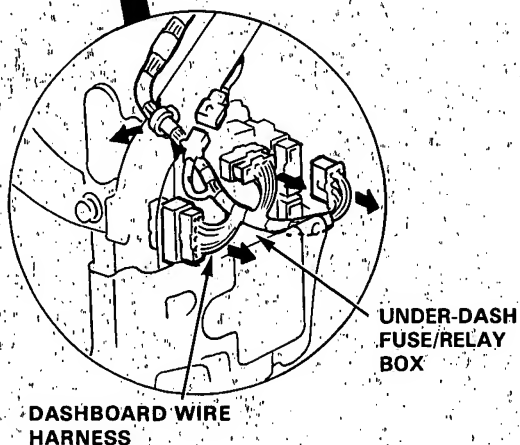
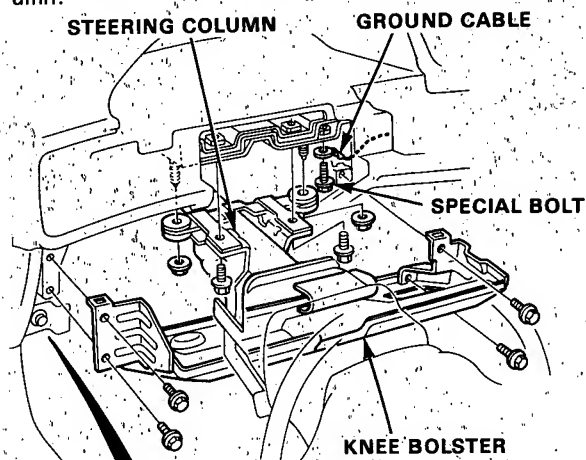
# Dashboard

## Replacement

1. To remove the dashboard, first slide the seats back fully.
2. Remove the right and left dashboard lower covers (see page 20-75).
3. Remove the front console (see page 20-73).
4. Remove the knee bolster (driver's).
5. Disconnect the wire harness from the connectors and fuse box.
6. Lower the steering column.

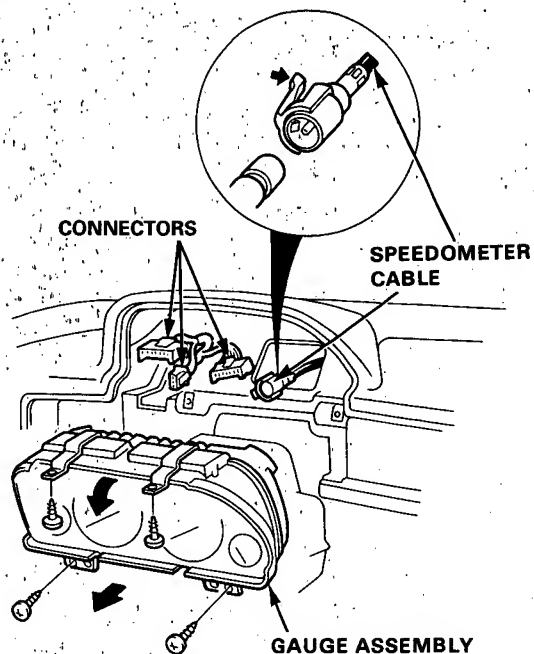
NOTE: To prevent damage to the steering column, wrap it with a shop towel.

7. Disconnect the ground cable at right of steering column.



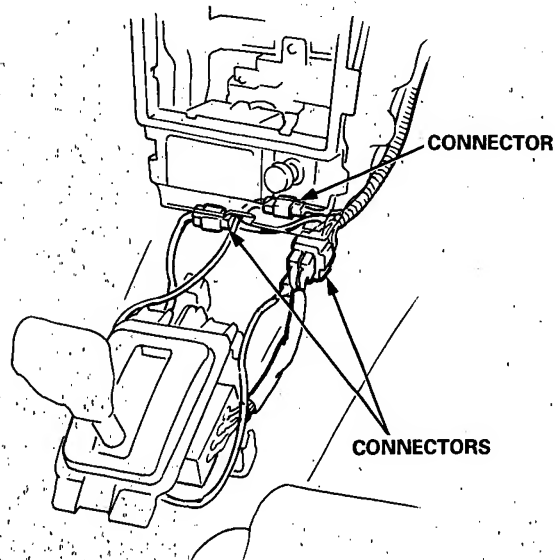
8. Remove the instrument panel (see page 20-75).

9. Remove the four screws, then pull the gauge assembly out half-way and disconnect the speedometer cable and connectors.



10. Disconnect the antenna lead, wire connector and loosen the two screws, then remove the stereo radio (see page 20-73).

11. Disconnect the A/T gear position switch and shift lock wire connectors from the dashboard wire harness (A/T model).





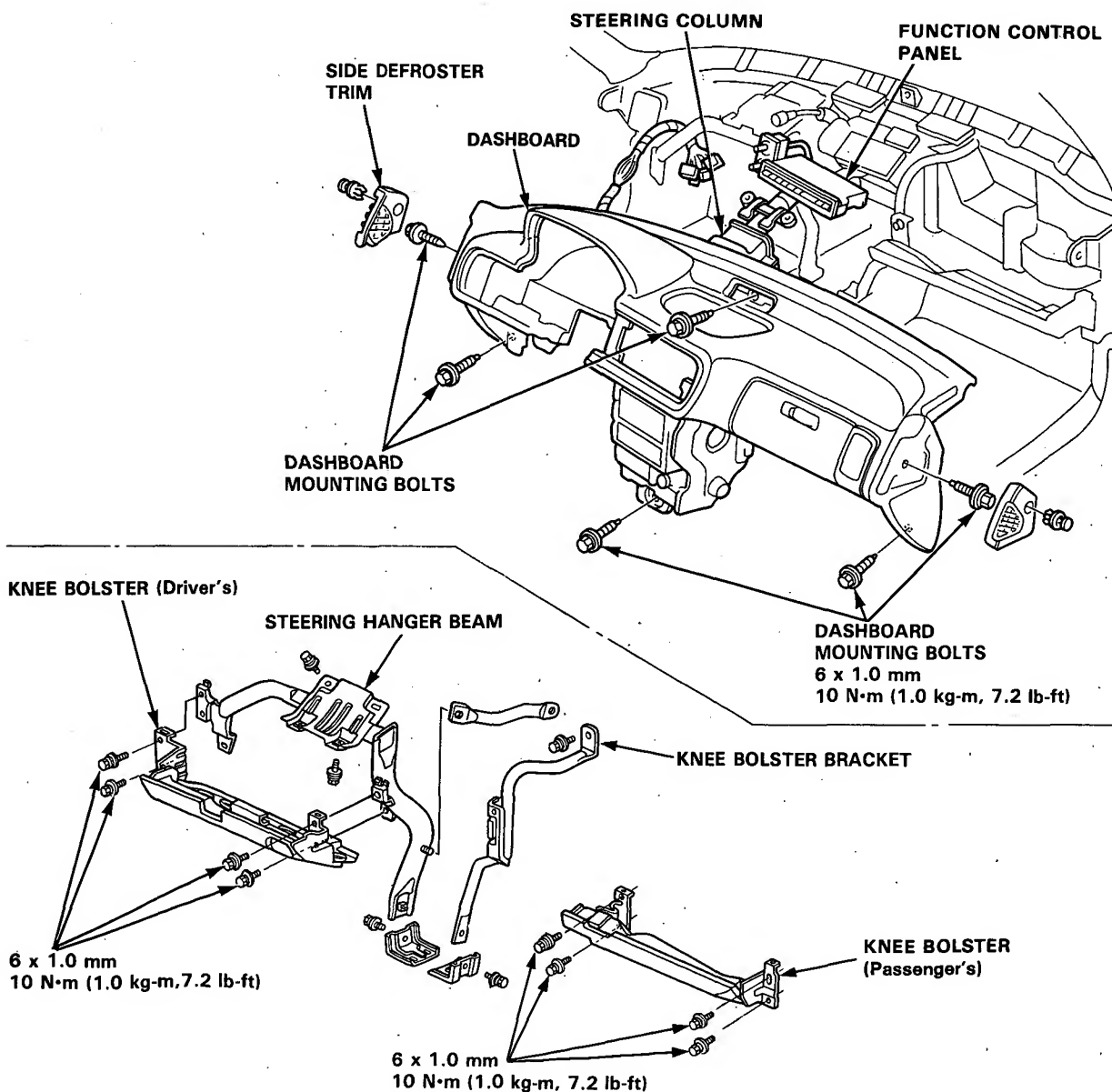


12. Remove the clock from the top of the dashboard (see page 20-75).
13. Remove the side defroster trim from both ends of the dashboard.
14. Remove the dashboard mounting bolts.
15. Lift and remove the dashboard.

**CAUTION:**

- Use protective tape on the bottom of the front pillar trim.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

**NOTE:** Take care not to scratch the dashboard.



16. Installation is the reverse of the removal procedure.

**NOTE:**

- Make sure the dashboard fits onto the body correctly.
- Before tightening the dashboard bolts, make sure the dashboard wires are not pinched, and that the dashboard is not interfering with the heater control cable.

# Front Bumper

## Replacement

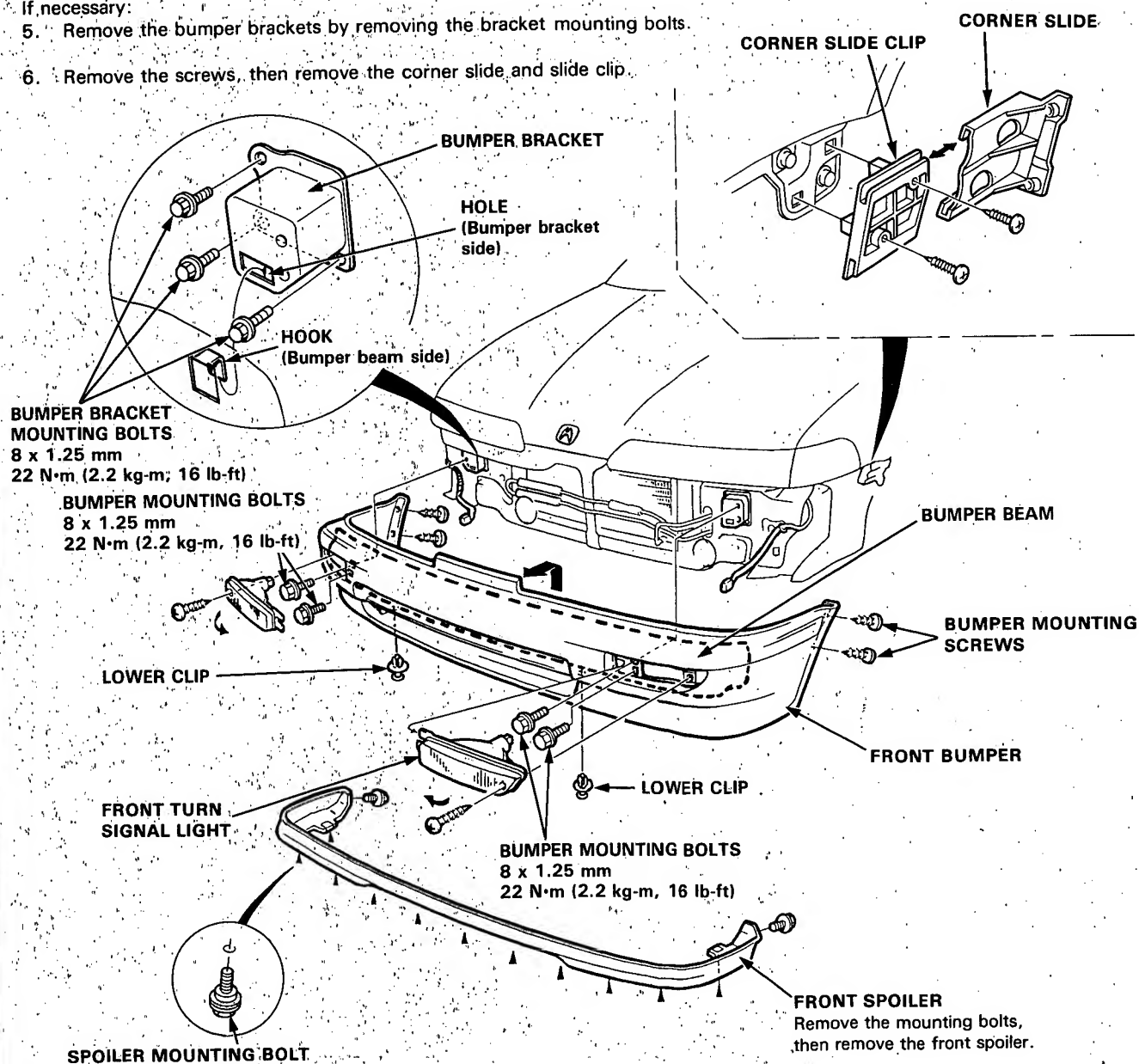
### NOTE:

- An assistant is helpful when removing the front bumper.
- Take care not to scratch the bumper.

1. Remove the right and left front turn signal lights.
2. Remove the two bumper mounting screws on each side at the corner edge of the bumper.
3. Remove the two lower clips and the four bumper mounting bolts.
4. Lift and remove the bumper by sliding it forward.

If necessary:

5. Remove the bumper brackets by removing the bracket mounting bolts.
6. Remove the screws, then remove the corner slide and slide clip.



7. Installation is the reverse of the removal procedure.

NOTE: Insert the bumper beam's hooks into the bumper bracket holes carefully.

# Rear Bumper



## Replacement

### NOTE:

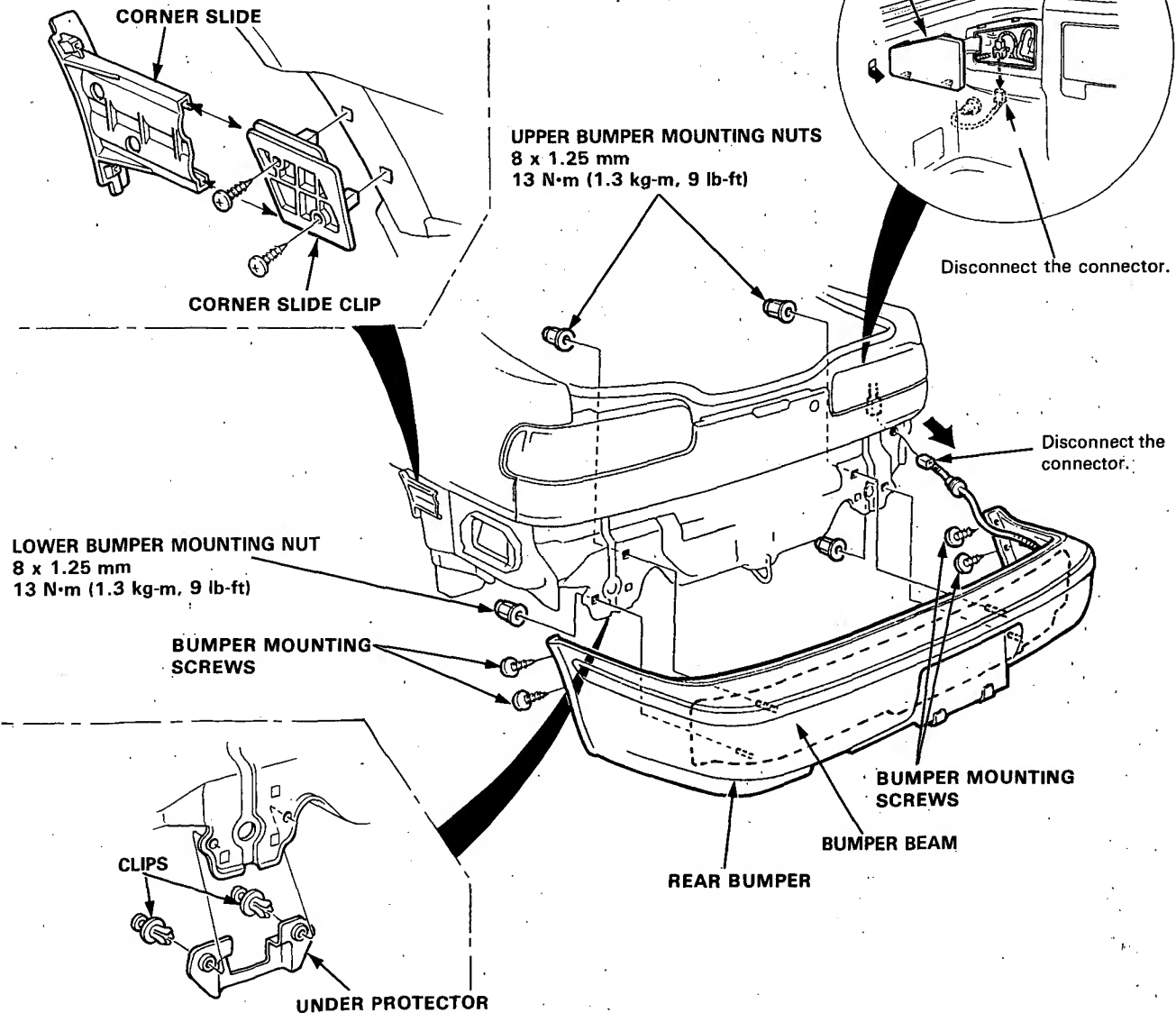
- An assistant is helpful when removing the rear bumper.
- Take care not to scratch the bumper.
- Open the trunk lid.

1. Remove the two bumper mounting screws on each side at the corner edge of the bumper.
2. Remove the right access panel and disconnect the license light wire connector.
3. Remove the two upper bumper mounting nuts from the trunk area.
4. Remove the clips, then remove the under protectors on each side from under the trunk floor.
5. Remove the two lower bumper mounting nuts from under the trunk floor.
6. Pull out the wire harness from the trunk area and remove the bumper by sliding it to the rear.

NOTE: Do not damage the threads of the bumper bolts.

If necessary:

7. Remove the screws, then remove the corner slide and slide clip.



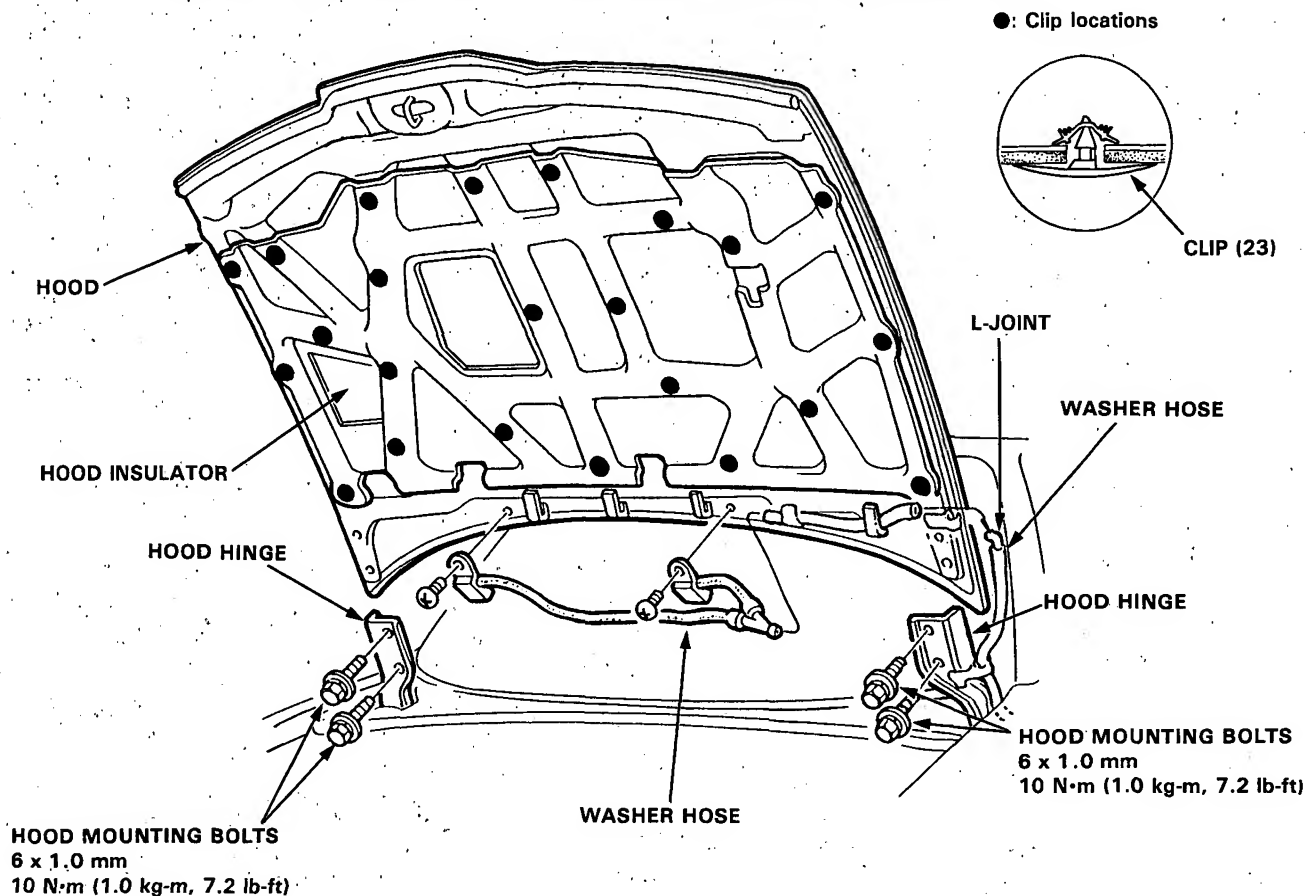
8. Installation is the reverse of the removal procedure.

## Hood

## -Replacement/Adjustment

**NOTE:** An assistant is helpful when removing the hood.

1. Disconnect the windshield washer hose at the L-joint, then pull it out of the hood.
2. Remove the hood by removing the mounting bolts on each side.
3. To remove the hood hinges, remove the front windshield wipers and air scoop (see section 23).

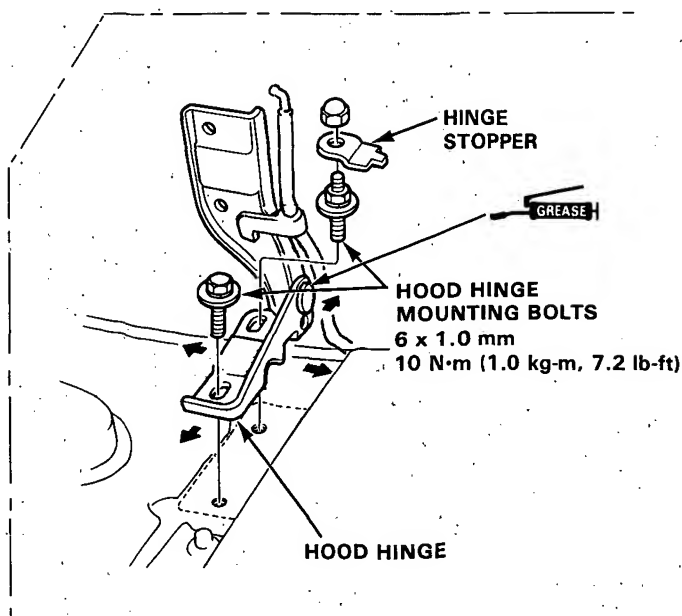


**ALIGNMENT:**

- The hinges can be adjusted right and left as well as fore and aft by using the elongated holes.
- Adjust the hood latch to obtain the proper height at the forward edge (see page 20-81).

4. Installation is the reverse of the removal procedure.

**NOTE:** Align the hood with the body.



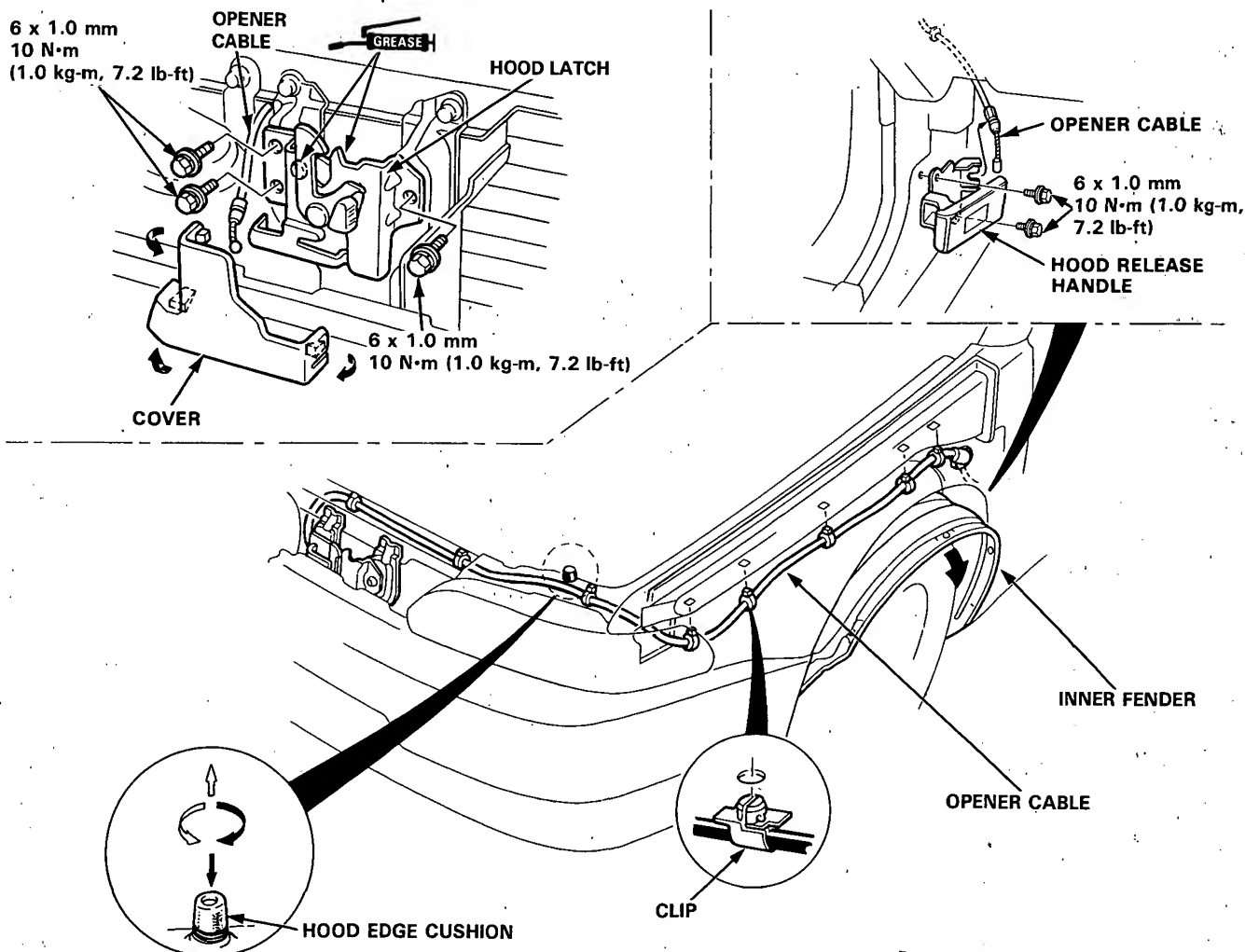


## Opener and Latch Replacement

1. Remove the bolts, then remove the hood release handle and disconnect the opener cable.
2. Remove the three mounting bolts and cover, then remove the hood latch and disconnect the opener cable.
3. Remove the left side inner fender, then pull out the opener cable.

### NOTE:

- Before pulling out the opener cable, tie a string to the opener cable so you can pull it back in later.
- Take care not to bend the opener cable.



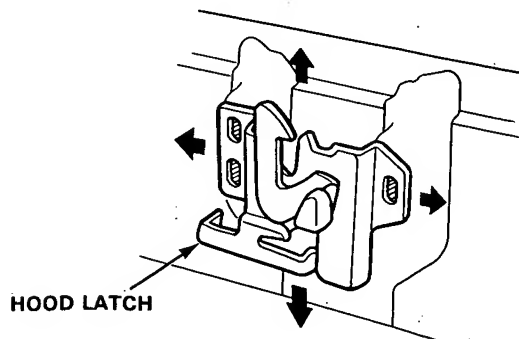
4. Installation is the reverse of the removal procedure.

### NOTE:

- Make sure the opener cable is routed and connected properly.
- Align the hood with the body.
- If necessary, replace any damaged clips.

### ALIGNMENT:

- Move the latch up or down or right or left as necessary to equalize the gap between the hood and the body.
- Turn the edge cushions as necessary, to make the hood fit flush with the body at front and side edges.



# Tailgate

## Replacement/Adjustment

### NOTE:

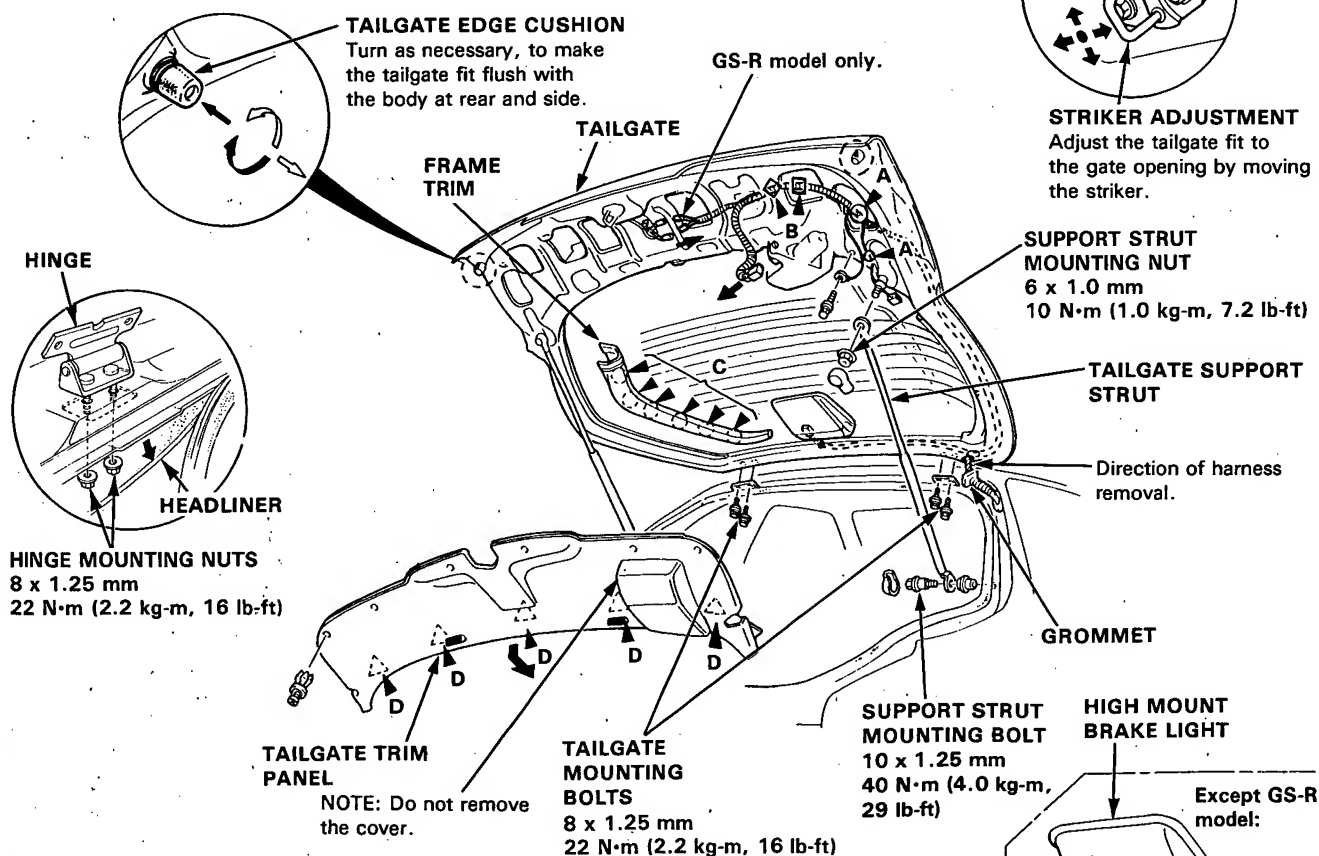
- An assistant is helpful when removing the tailgate.
  - Take care not to scratch or damage the tailgate and body.
1. Detach the clips, then remove the tailgate trim panel.
  2. Pull the wire harness out of the tailgate.  
NOTE: Before pulling out the wire harness, tie a string to the end of it so you can pull it back in when the tailgate is reinstalled.
  3. Remove the tailgate support struts.
  4. Remove the tailgate by removing the tailgate mounting bolts.

If necessary: Lower the rear of the headliner just enough to gain access to the hinge mounting nuts, then remove the hinge by removing the hinge mounting nuts.

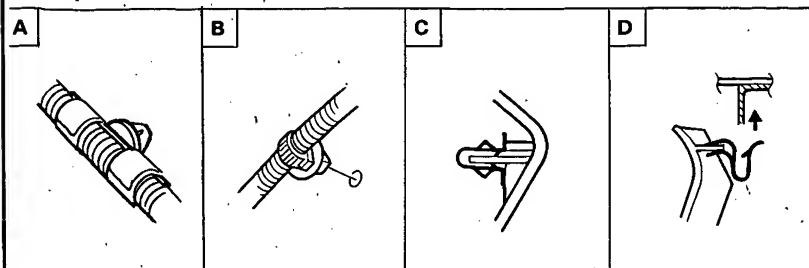
5. Installation is the reverse of the removal procedure.

### NOTE:

- Before tightening the hinge nuts, align the tailgate with the body.
- Use care when pulling the wire harness back in to avoid damaging the body.
- Coat the inside and outside of the grommet with sealant.



### ►: Clip locations



# Trunk Lid



## Replacement/Adjustment

### NOTE:

- An assistant is helpful when removing the trunk lid.
- Take care not to scratch or damage the trunk lid and body.

1. Pull the wire harness and trunk lid opener cable out of the trunk lid.

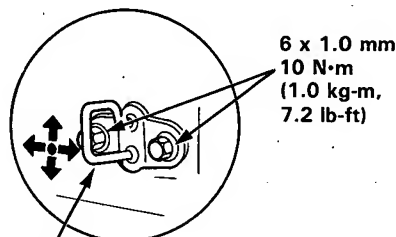
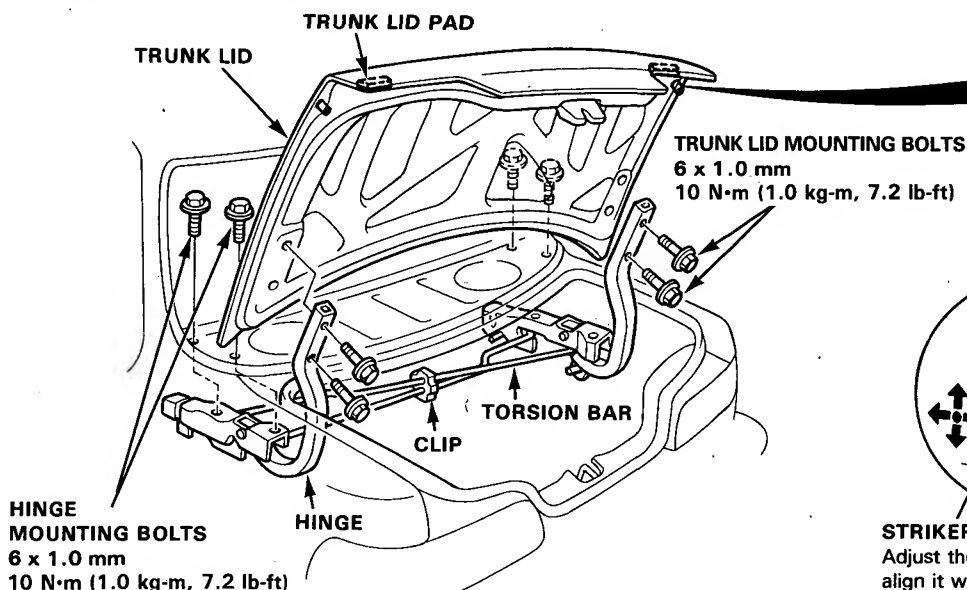
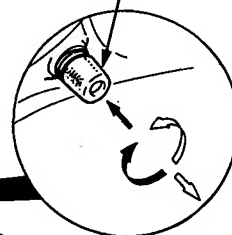
NOTE: Before pulling out the wire harness, tie a string to the end of it so you can pull it back in when the trunk lid is reinstalled.

2. Remove the trunk lid mounting bolts, then lift off the lid.
3. Remove the torsion bar using a assembly tool.
4. Remove the rear shelf.
5. Remove the hinge mounting bolts, then remove the hinges from the body.
6. Installation is the reverse of the removal procedure.

NOTE: Align the trunk lid with the body.

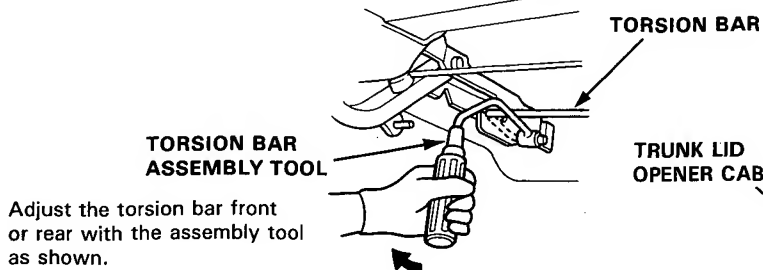
### TRUNK LID EDGE CUSHION

Turn as necessary, to make the trunk lid fit flush with the body at the rear and side edges.

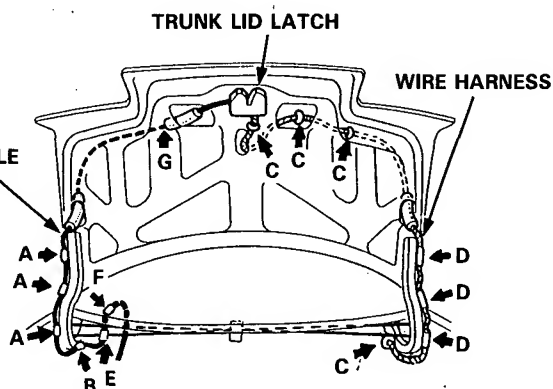


### STRIKER

Adjust the striker right or left to align it with the latch.

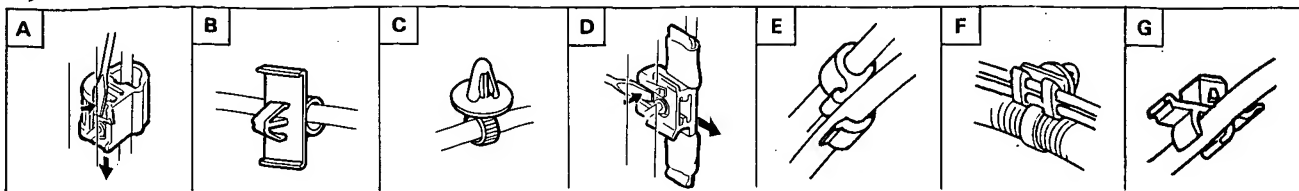


### TRUNK LID OPENER CABLE



If necessary, replace any damaged clips.

➡ : Clip locations



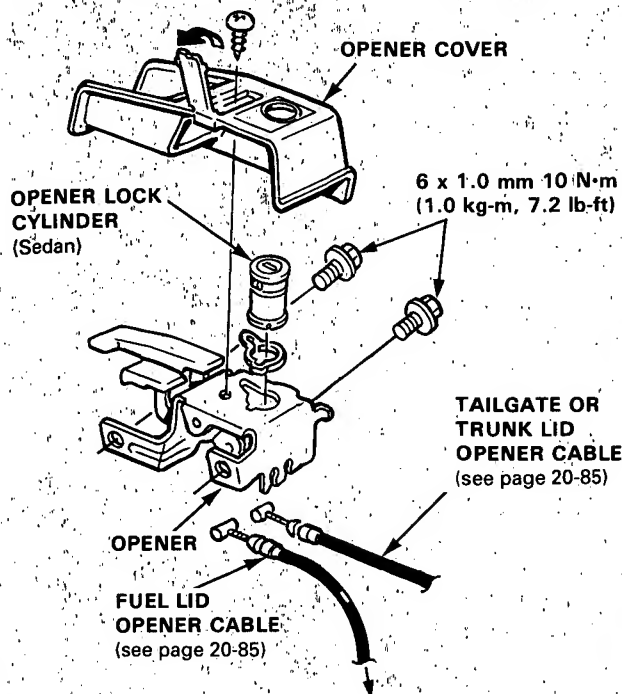
# Opener/Latch

## Replacement

**CAUTION:** When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

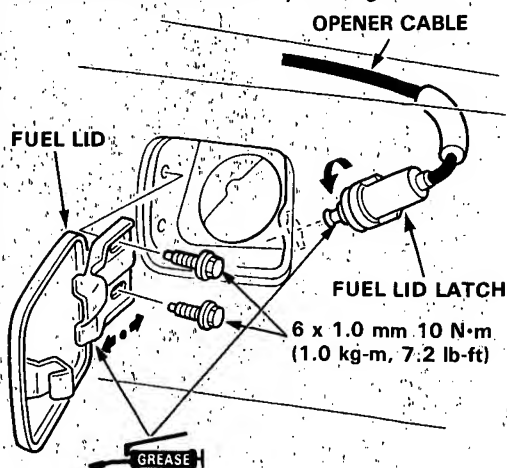
### Opener:

1. Remove the screw, then remove the opener cover.
2. Remove the opener by removing the two bolts.



### Fuel Lid Opener:

1. Remove:
  - Hatchback: Left quarter trim panel (see page 20-61)
  - Sedan: Left trunk side panel (see page 20-62)
2. Remove the fuel lid latch by turning it 90°.



4. Installation is the reverse of the removal procedure.

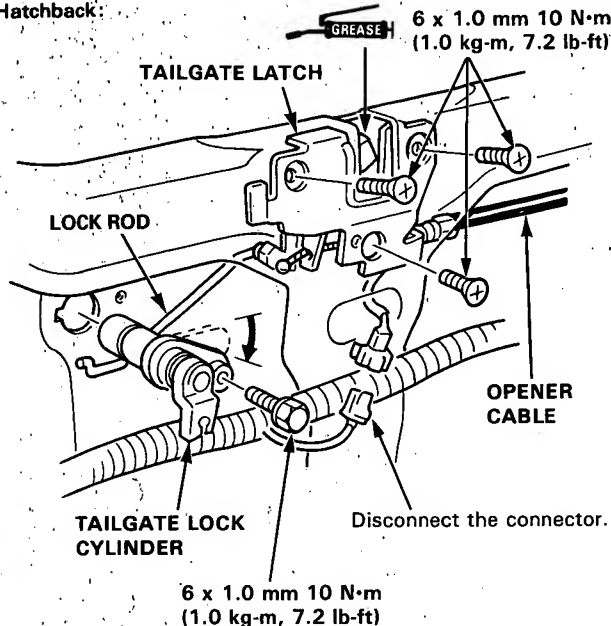
### NOTE:

- Make sure the opener cable, lock rods and connectors are connected properly.
- Take care not to bend the opener cable.
- Make sure the fuel lid fits flush with the body.

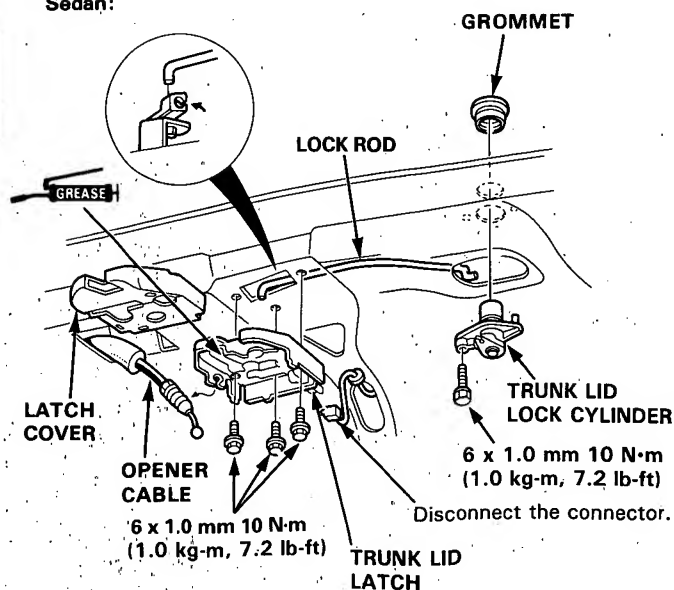
### Trunk/Tailgate Latch:

1. Remove the rear trim panel (hatchback see page 20-61).
2. Remove the bolt and disconnect the latch rod, then remove the lock cylinder.
3. Remove the latch by removing the mounting screws (hatchback) or bolts (sedan) and disconnect the cable and wire connector.

### Hatchback:



### Sedan:





# Opener Cables



## Replacement

### 1. Remove:

Hatchback: (see page 20-61)

- Left side door sill molding, left half of carpet
- Left quarter trim panel, and rear trim panel

Sedan: (see page 20-62)

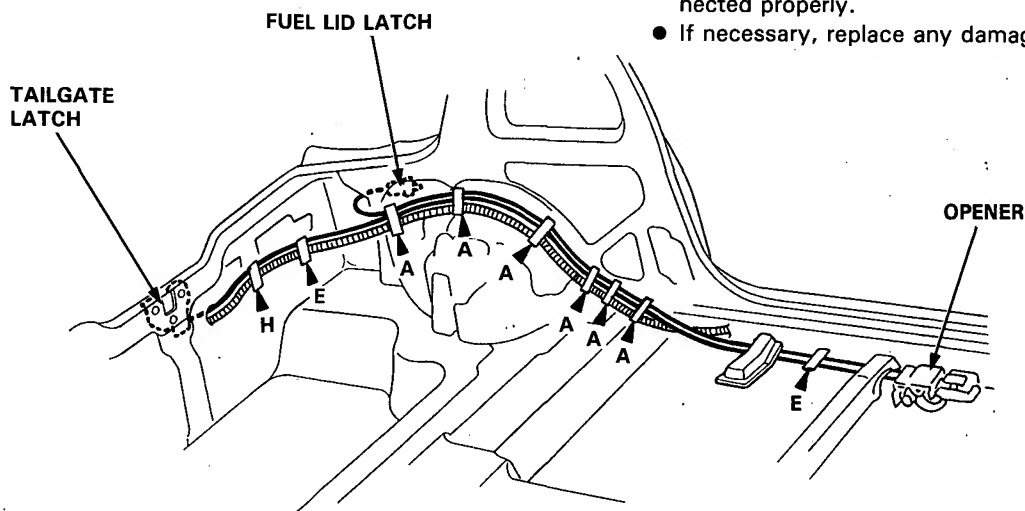
- Left side front and rear door sill moldings, left half of carpet
- Left trunk side panel

2. Disconnect the opener cables from the opener and latch (see page 20-84).
3. Remove the fuel lid latch (see page 20-84).
4. Remove the opener cables by removing the clips as shown.
5. Installation is the reverse of the removal procedure.

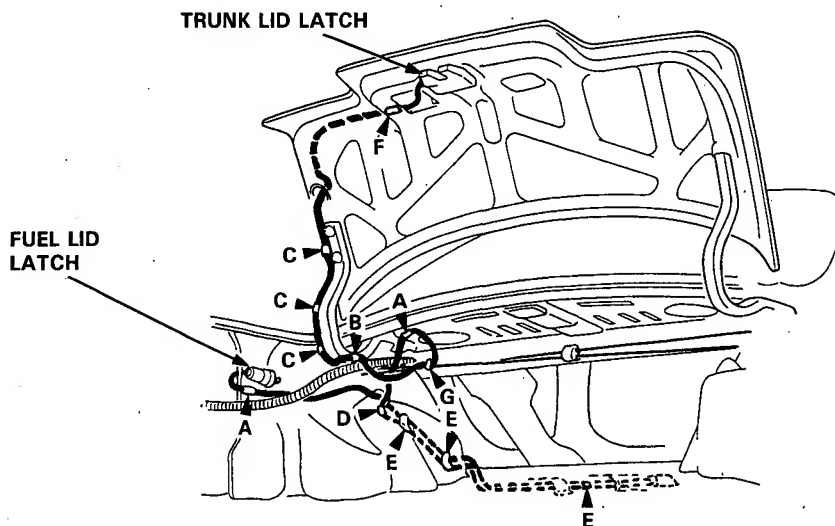
### NOTE:

- Take care not to bend the opener cables.
- Make sure the opener cables are routed and connected properly.
- If necessary, replace any damaged clips.

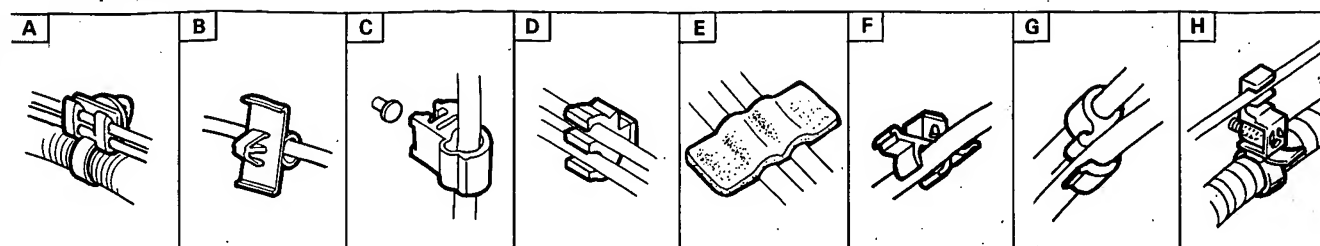
Hatchback:



Sedan:



►: Clip locations



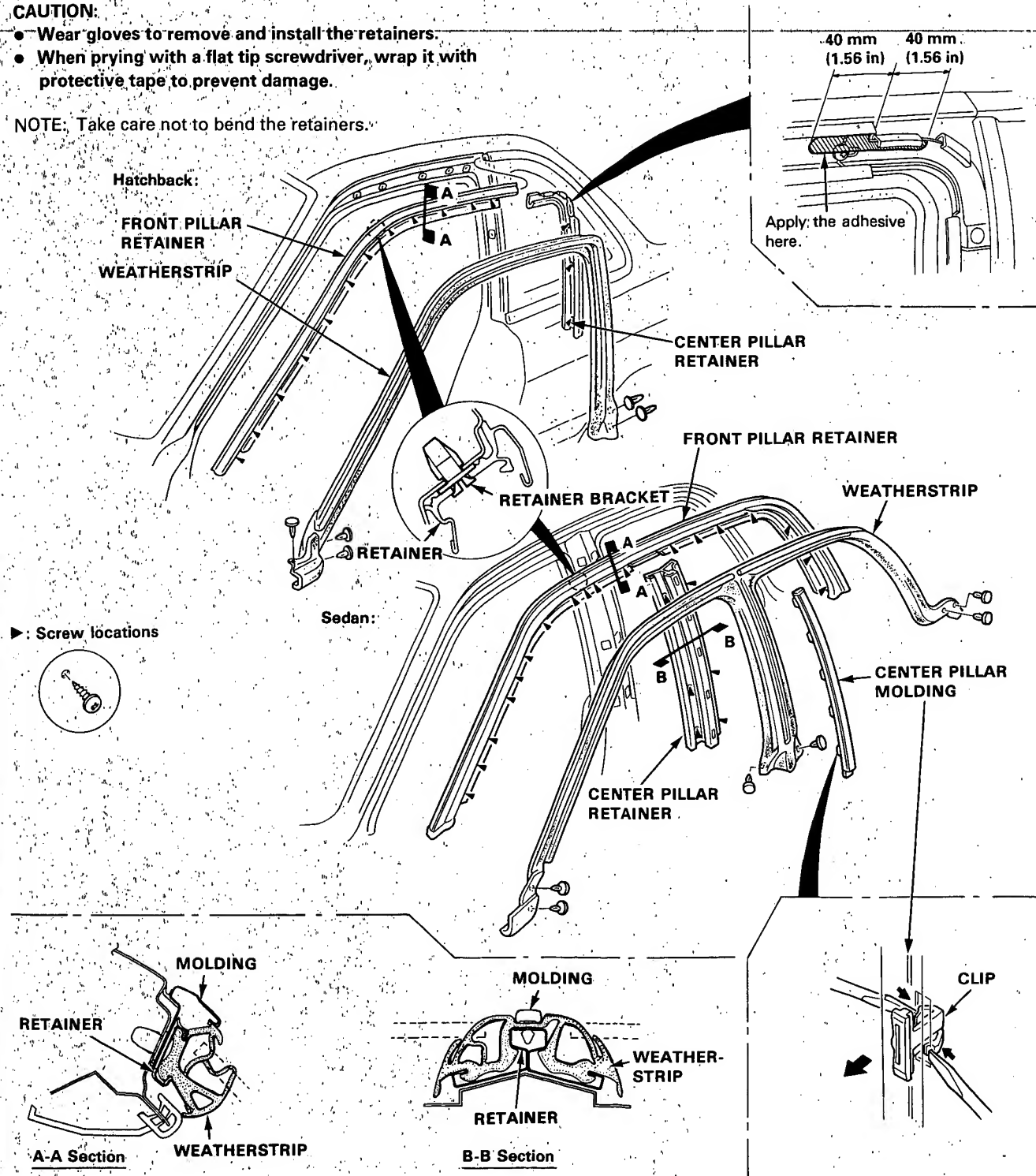
# Side Window Molding/Weatherstrip

## Replacement

### CAUTION:

- Wear gloves to remove and install the retainers.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

NOTE: Take care not to bend the retainers.



Installation is the reverse of the removal procedure.

### NOTE:

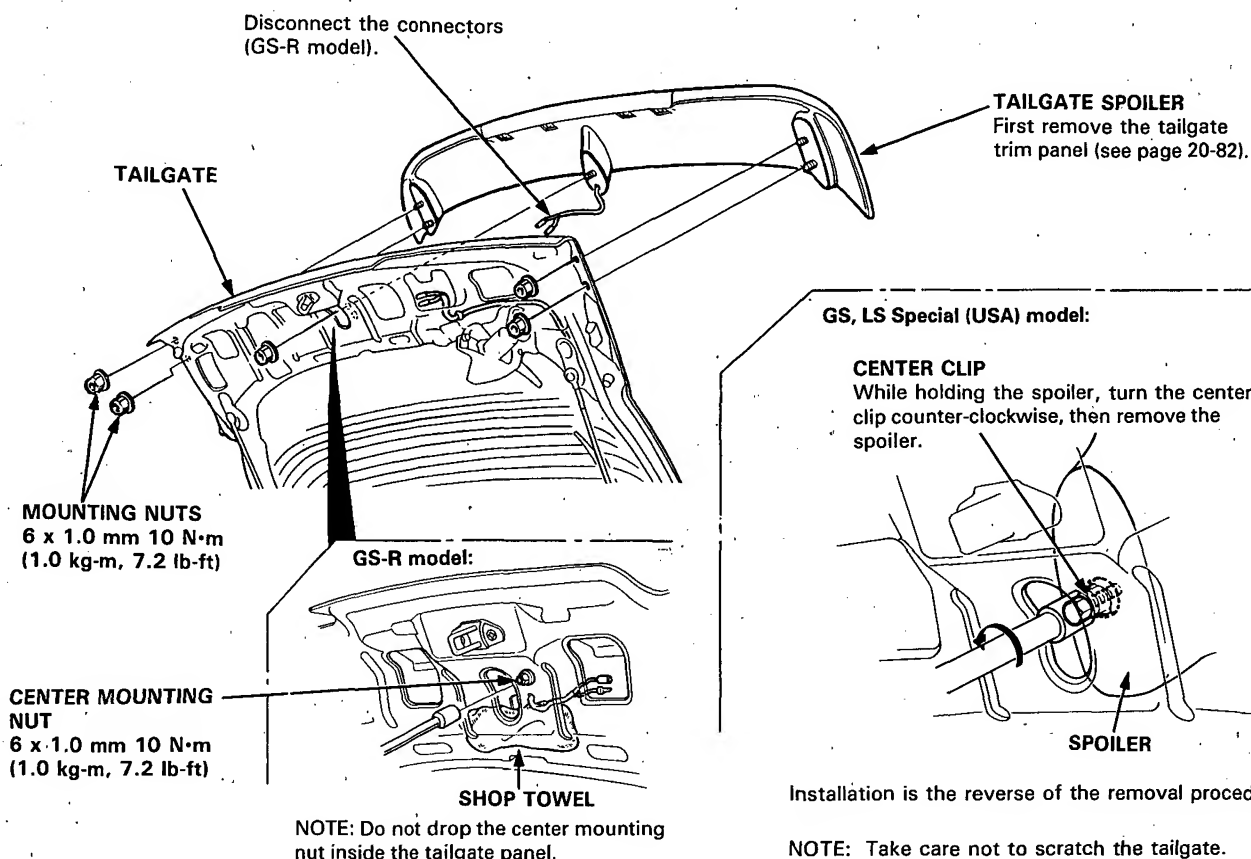
- If necessary, replace any damaged clips.
- After installing the weatherstrip, close the doors, then check for water leaks.
- Do not use high pressure water.



# Tailgate Spoiler/Side Moldings

## Tailgate Spoiler Replacement

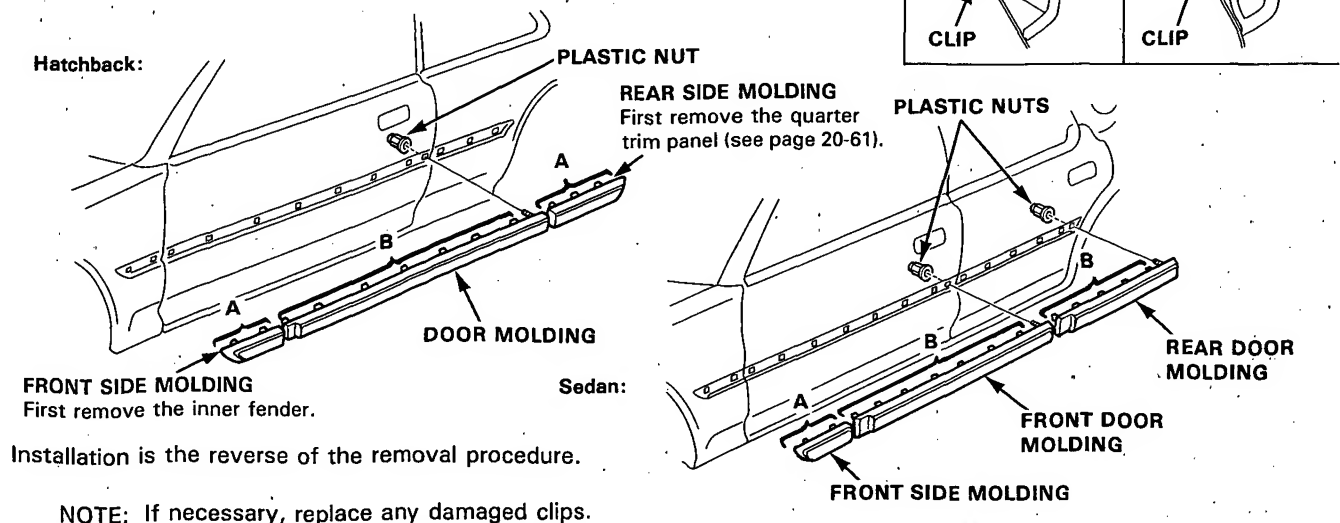
**CAUTION:** When removing the tailgate spoiler, use protective tape or a shop towel on the tailgate and tailgate spoiler to prevent damage.



## Side Moldings Replacement

**NOTE:**

- To remove the door molding, first remove the door panel and plastic cover (see pages 20-5, 9, 12, 13).
- Take care not to bend the moldings.



# Rear Emblems

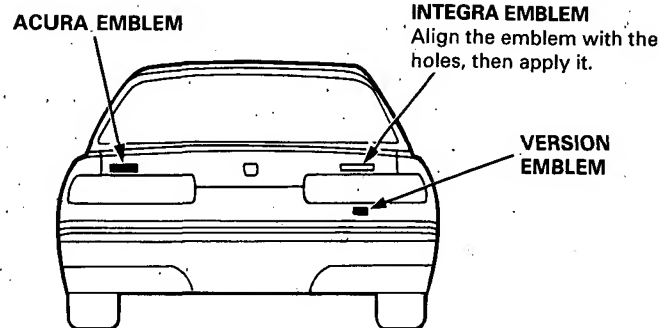
## Installation

Apply the emblems where shown.

### NOTE:

- Before applying, clean the body surface with a sponge dampened in alcohol.
- After cleaning, keep oil, grease or water from getting on the surface.
- When applying, make sure there are no wrinkles in the emblems.

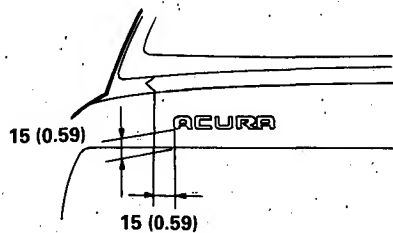
### Attachment Points :



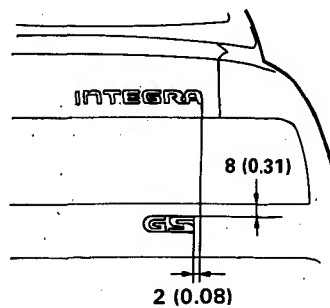
Unit: mm. (in)

### Hatchback/Sedan

#### ACURA Emblem

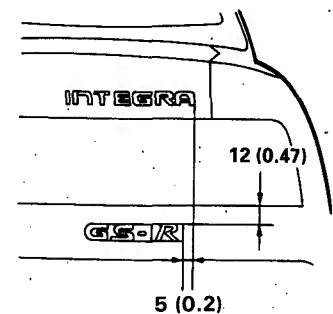


#### Version Emblem (Canada GS, LS, RS, models)



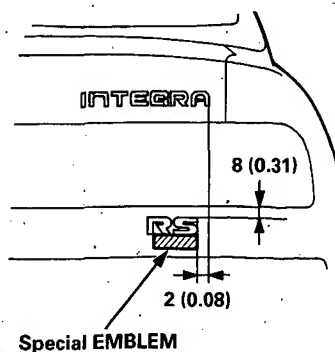
### Hatchback

#### Version Emblem (GS-R model only)

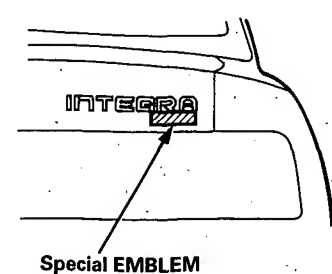


### Sedan

#### Version Emblem (Canada RS Special model only)



#### Version Emblem (USA LS Special model only)

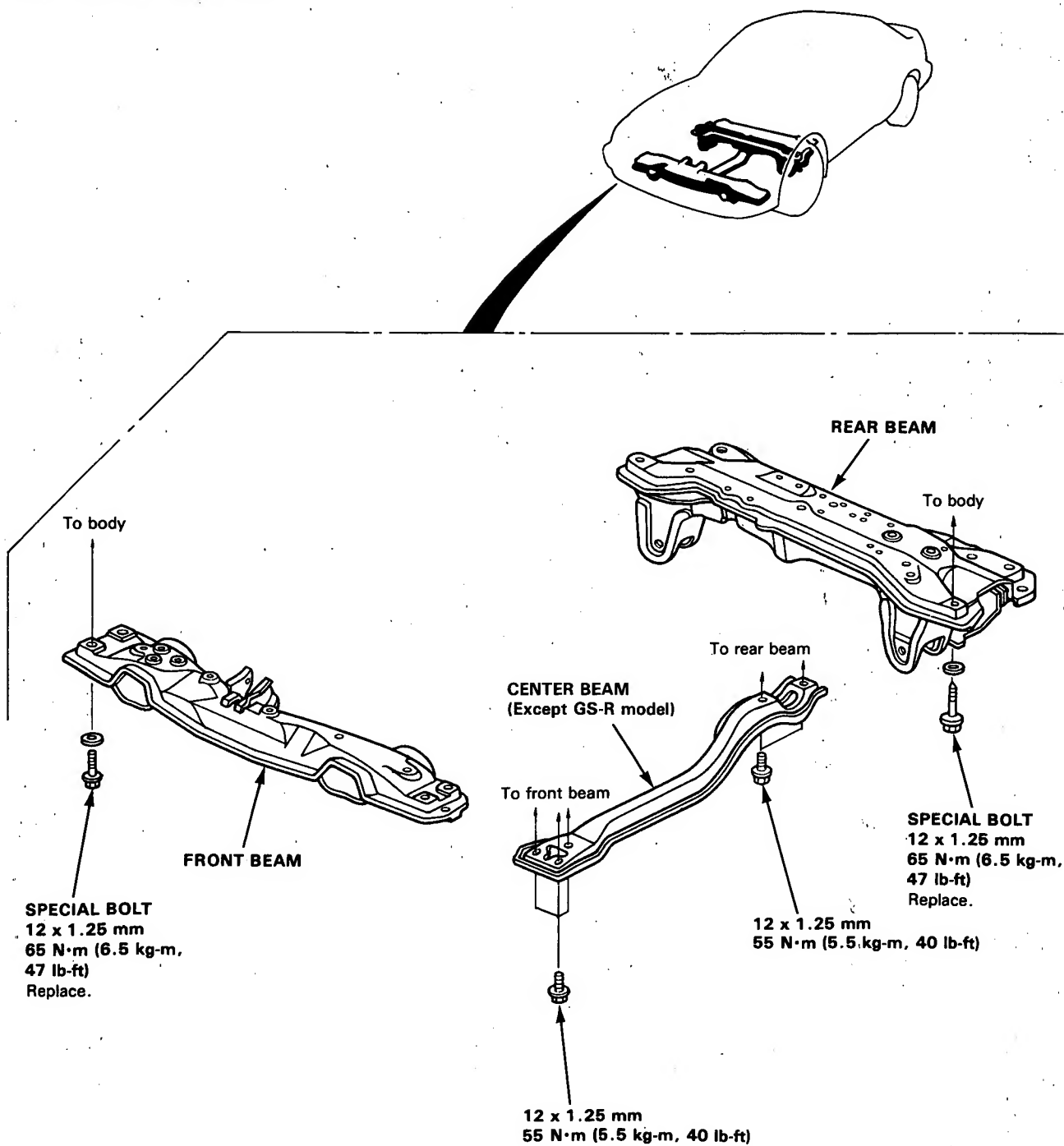


# Sub-frame



Sub-frame torque sequence:

**CAUTION:** After loosening the special bolts be sure to replace them with new ones.

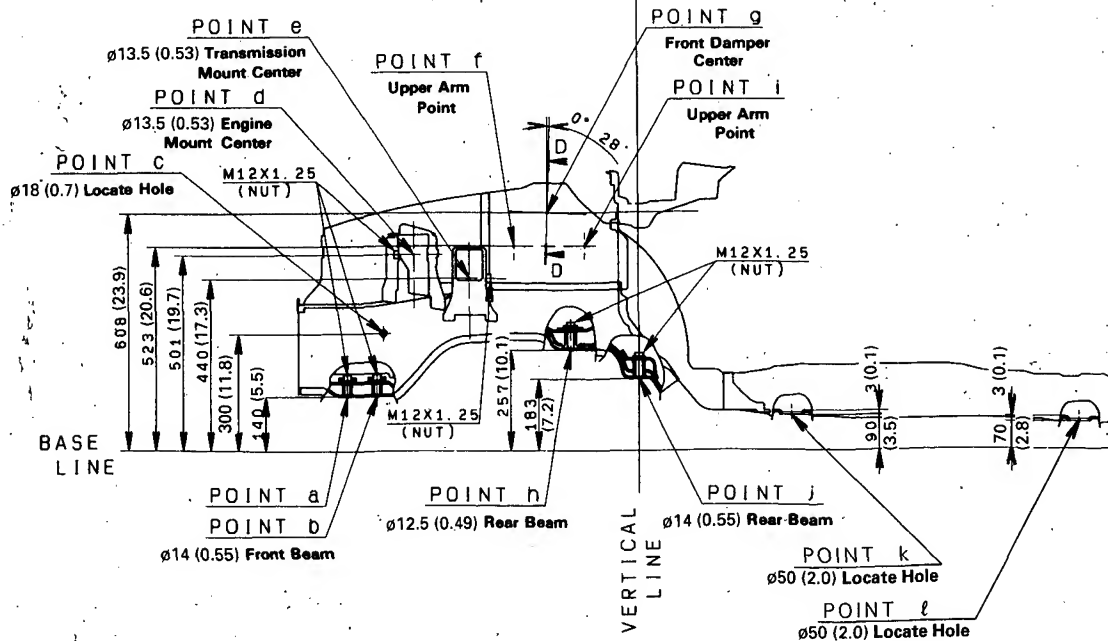
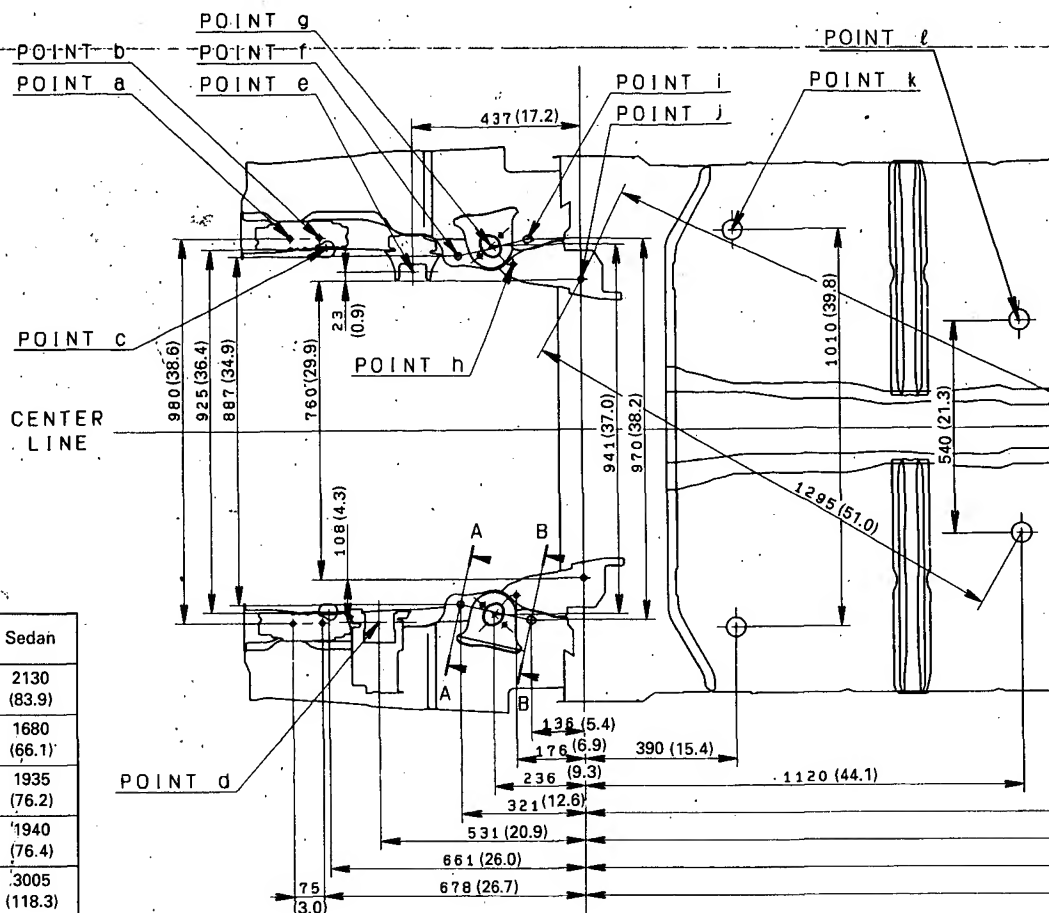


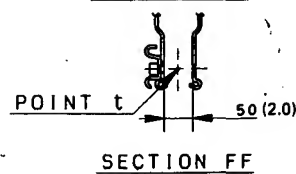
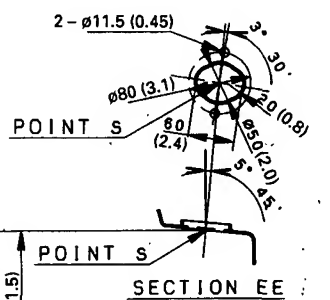
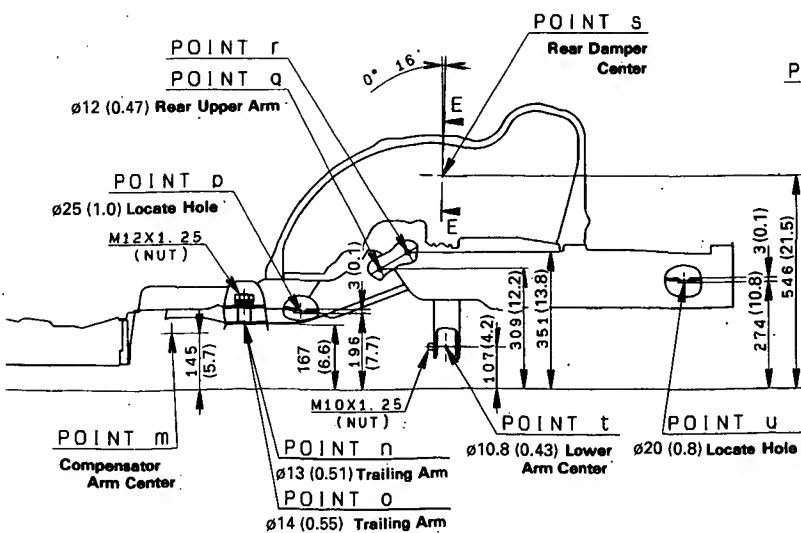
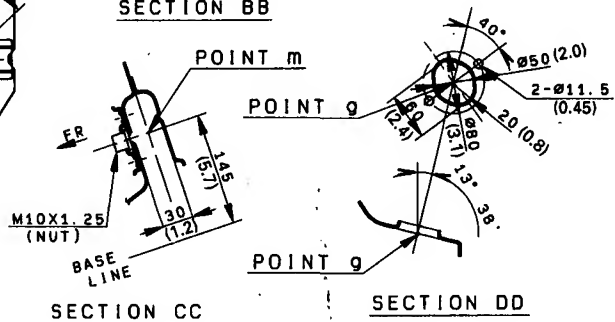
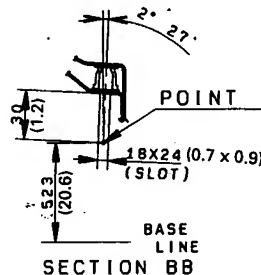
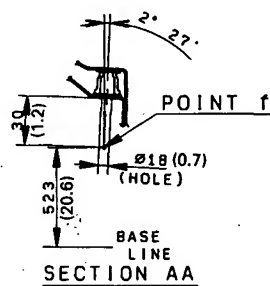
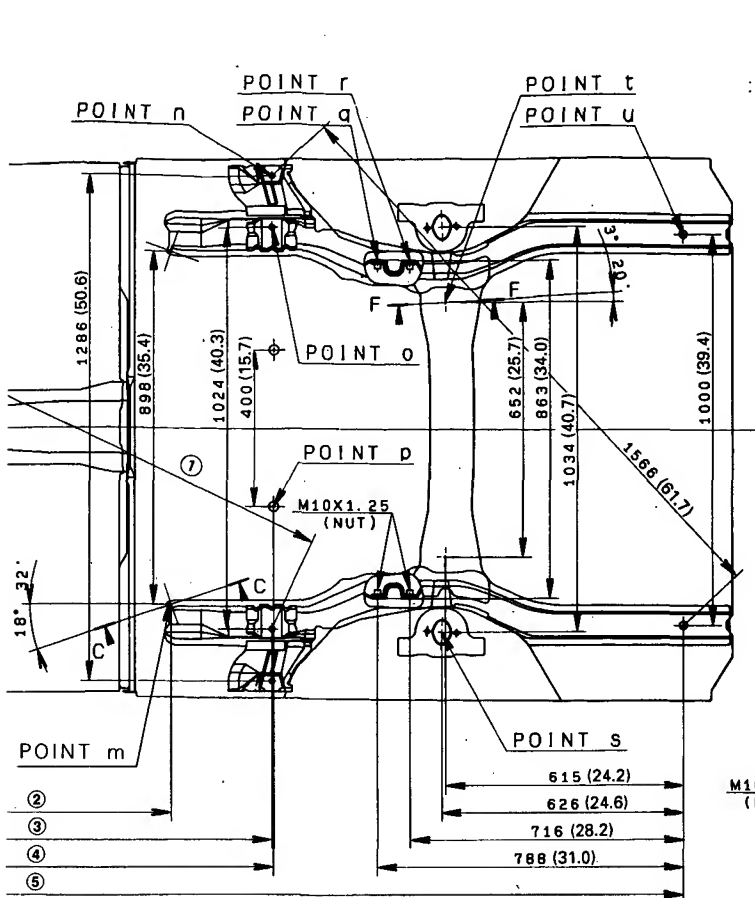
# Frame Repair Chart

A/T Model

Unit: mm (in)

Model	Hatchback	Sedan
Distance		
①	2085 (82.1)	2130 (83.9)
②	1630 (64.2)	1680 (66.1)
③	1885 (74.2)	1935 (76.2)
④	1890 (74.4)	1940 (76.4)
⑤	2955 (116.3)	3005 (118.3)



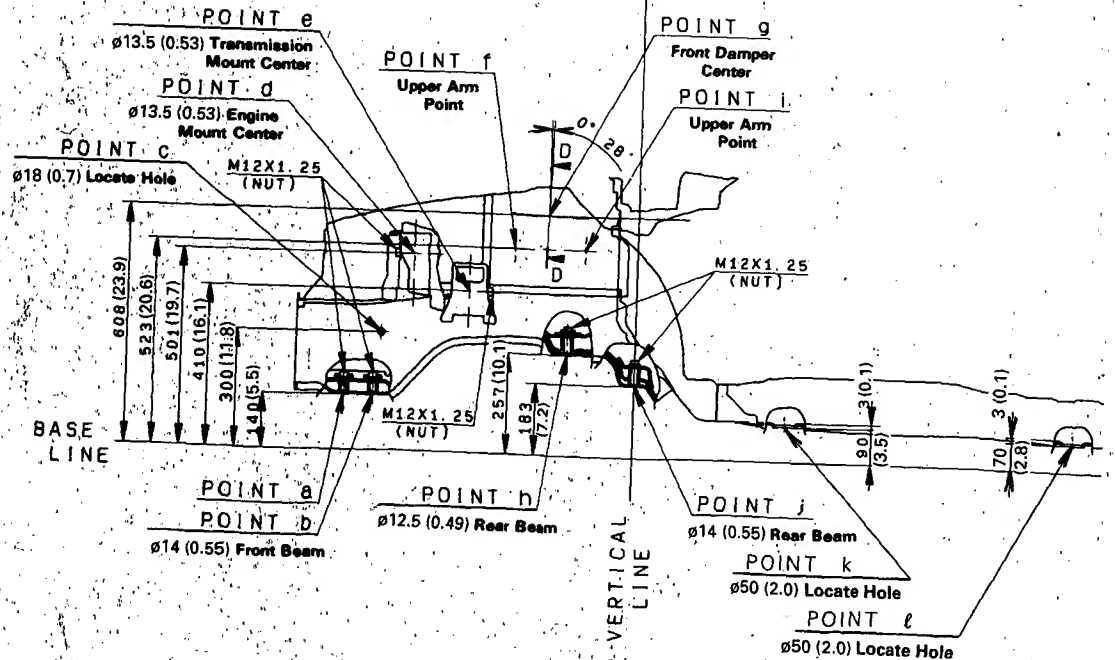
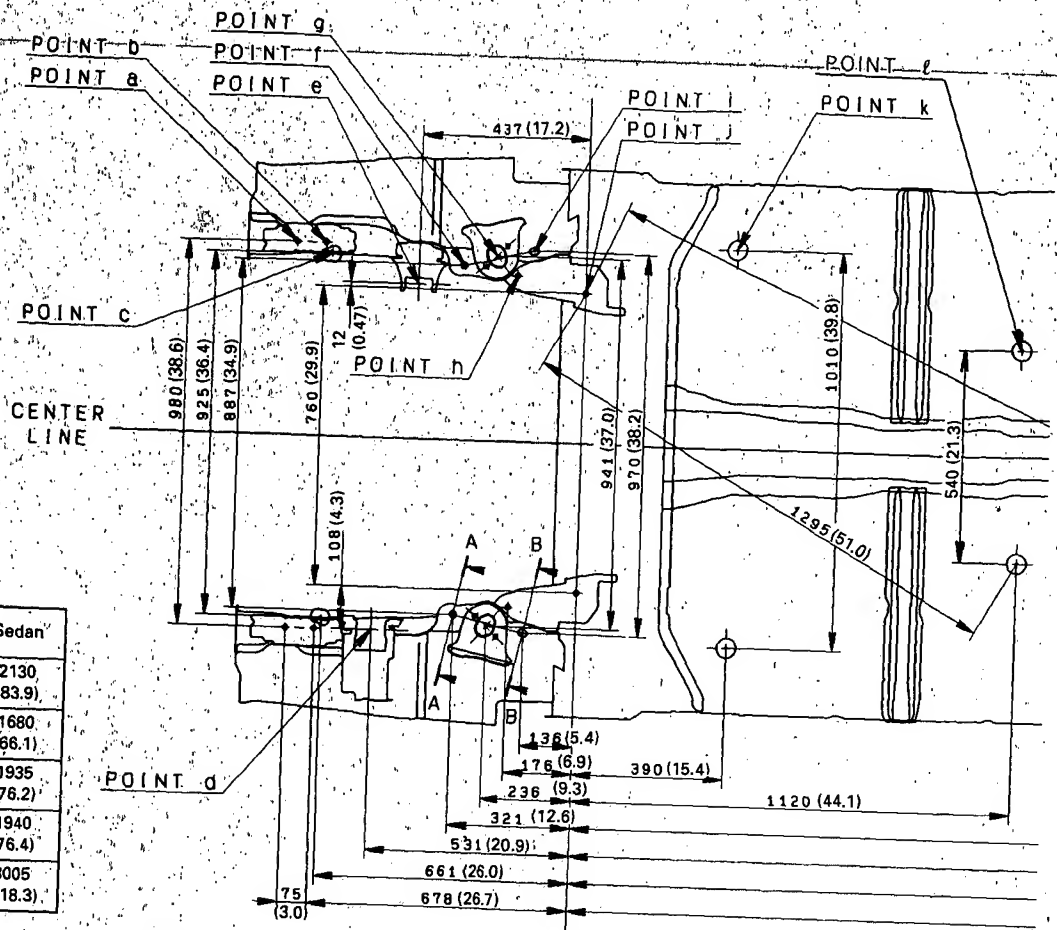


# Frame Repair Chart

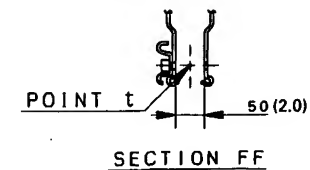
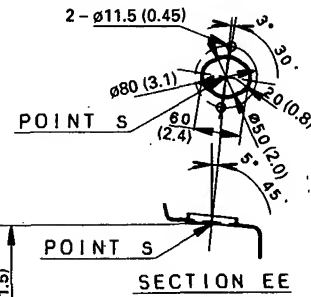
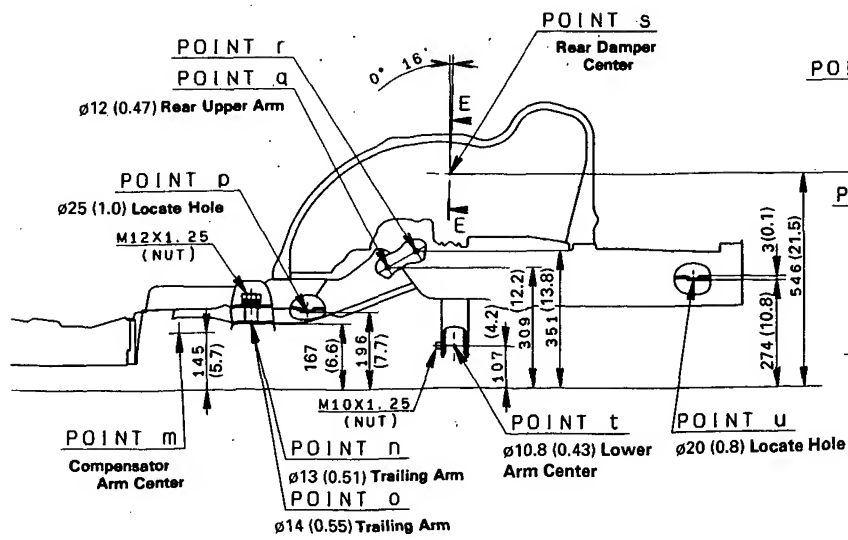
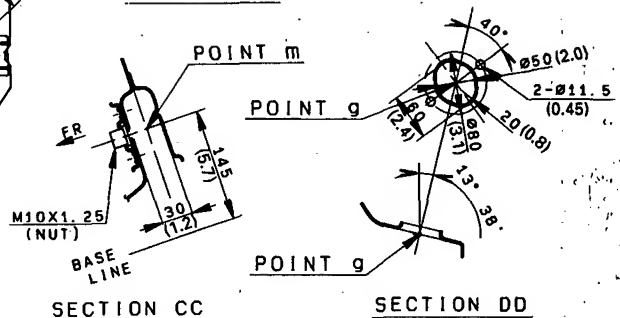
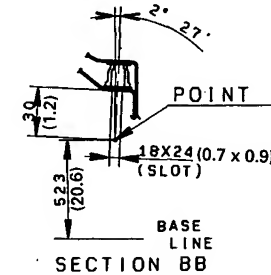
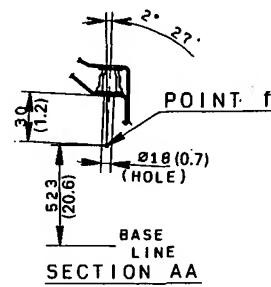
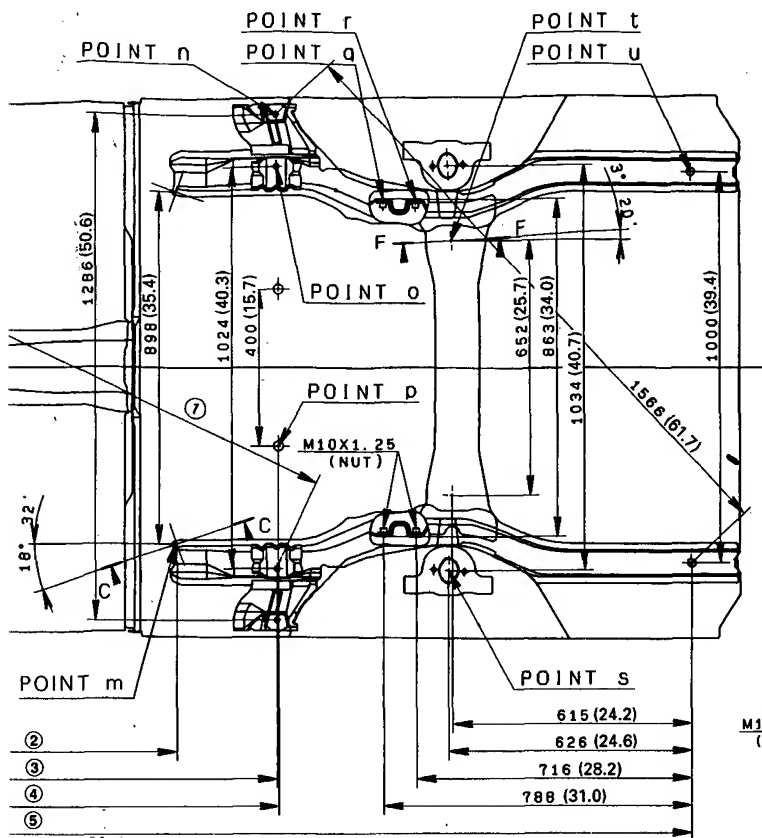
M/T Model

Unit: mm (in.)

Model	Hatchback	Sedan
Distance		
①	2085 (82.1)	2130 (83.9)
②	1630 (64.2)	1680 (66.1)
③	1885 (74.2)	1935 (76.2)
④	1890 (74.4)	1940 (76.4)
⑤	2955 (116.3)	3005 (118.3)



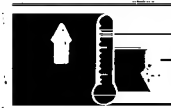






## Heater and Air Conditioning

Heater (Lever Type) .....	21-1
(Button Type) .....	21-19
Air Conditioning .....	22-1



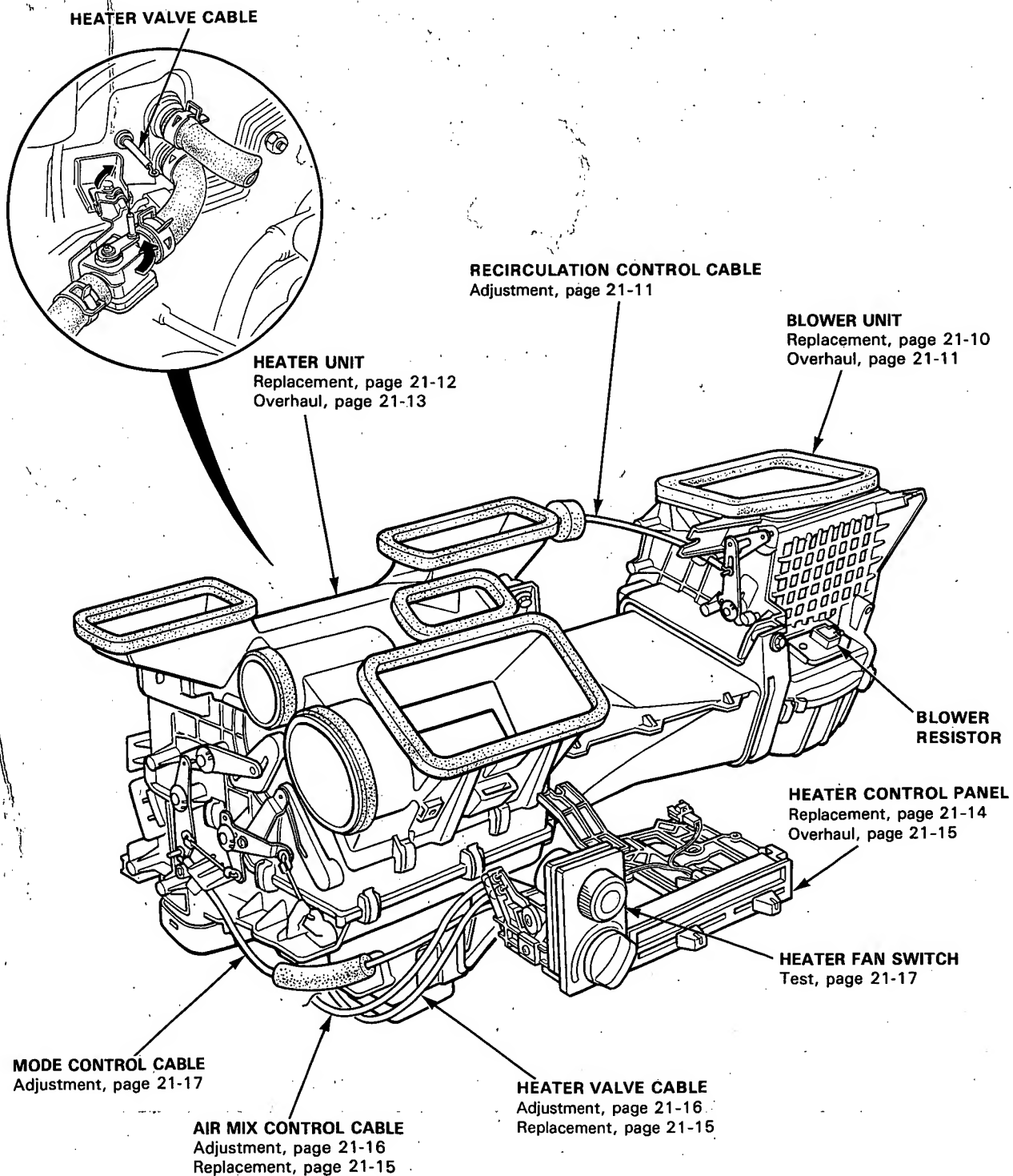


## **Heater (Lever Type)**

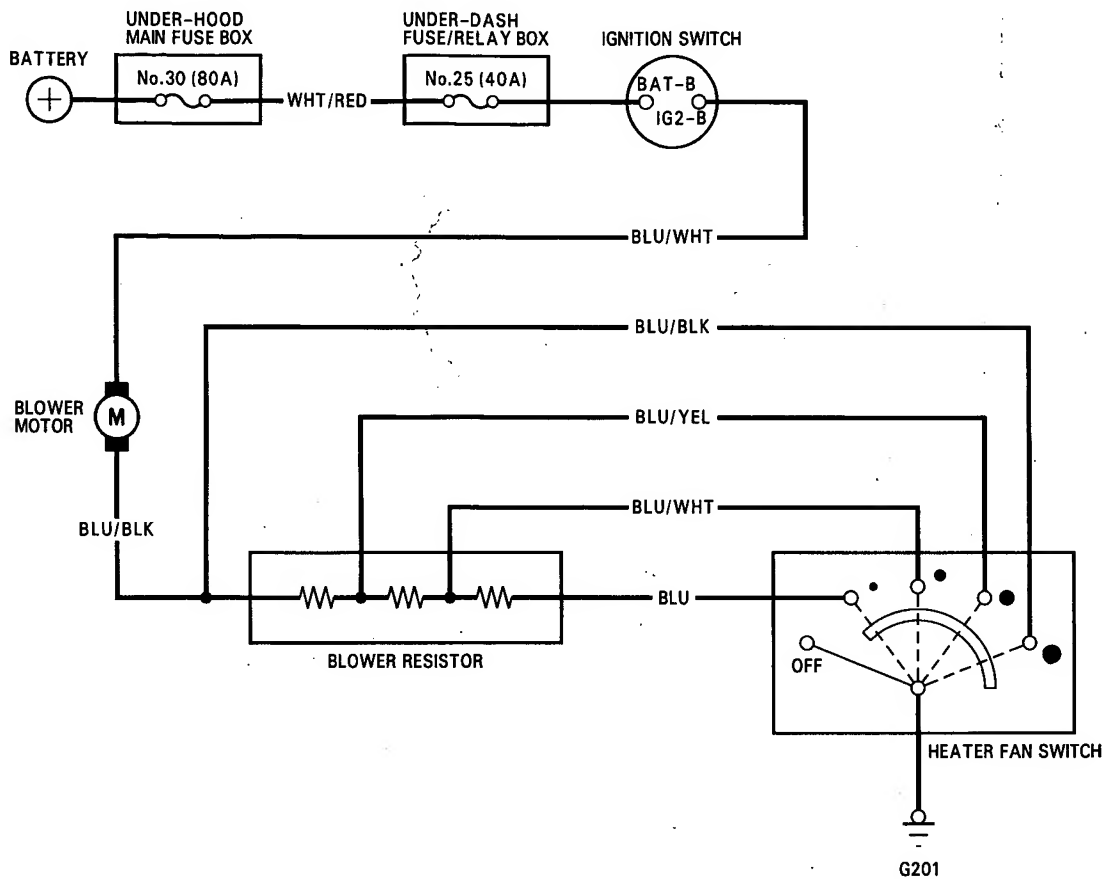
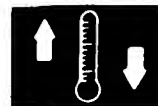
<b>Illustrated Index .....</b>	<b>21-2</b>
<b>Circuit Diagram .....</b>	<b>21-3</b>
<b>Door Positions .....</b>	<b>21-4</b>
<b>Troubleshooting</b>	
<b>Symptom Chart .....</b>	<b>21-6</b>
<b>Flowchart</b>	
<b>Blower Motor Speed .....</b>	<b>21-7</b>
<b>Blower .....</b>	<b>21-8</b>
<b>Blower Unit</b>	
<b>Replacement .....</b>	<b>21-10</b>
<b>Overhaul .....</b>	<b>21-11</b>
<b>Heater Unit</b>	
<b>Replacement .....</b>	<b>21-12</b>
<b>Overhaul .....</b>	<b>21-13</b>
<b>Heater Control Panel</b>	
<b>Replacement .....</b>	<b>21-14</b>
<b>Overhaul .....</b>	<b>21-15</b>
<b>Heater Control Cables</b>	
<b>Air Mix Control Cable</b>	
<b>Adjustment .....</b>	<b>21-16</b>
<b>Heater Valve Cable Adjustment .....</b>	<b>21-16</b>
<b>Mode Control Cable</b>	
<b>Adjustment .....</b>	<b>21-17</b>
<b>Heater Fan Switch</b>	
<b>Test .....</b>	<b>21-17</b>



# Illustrated Index



# Circuit Diagram

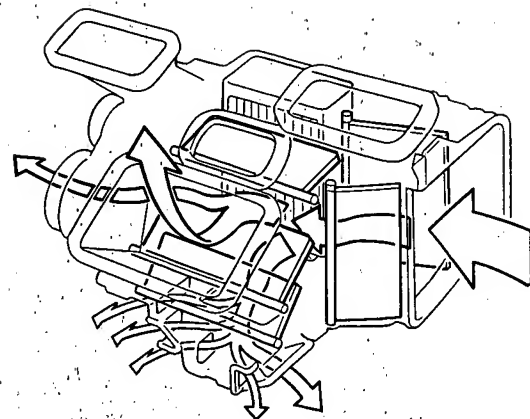
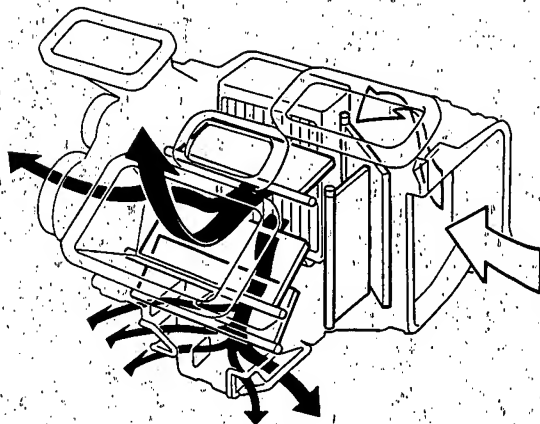
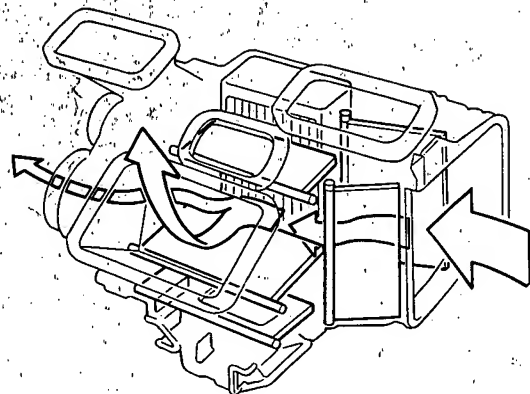
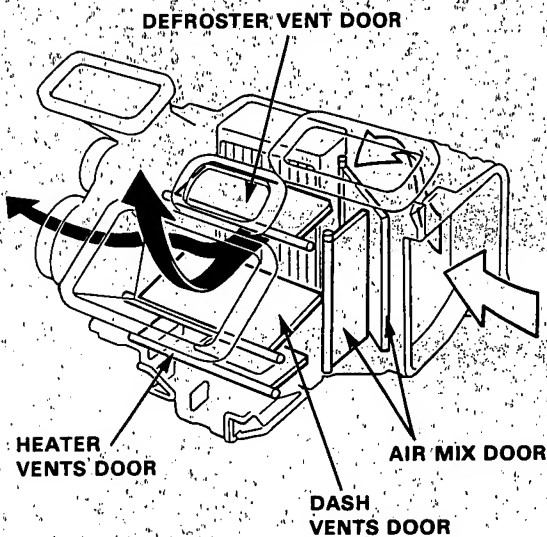


# Heater Door Positions

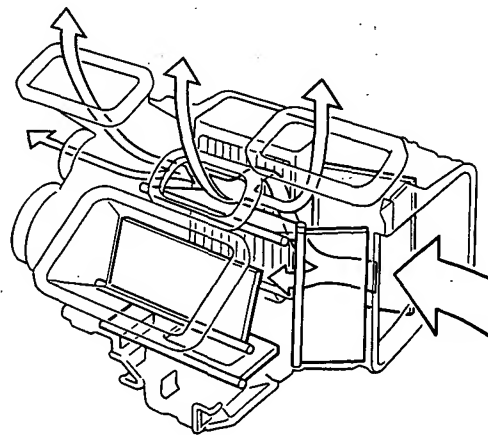
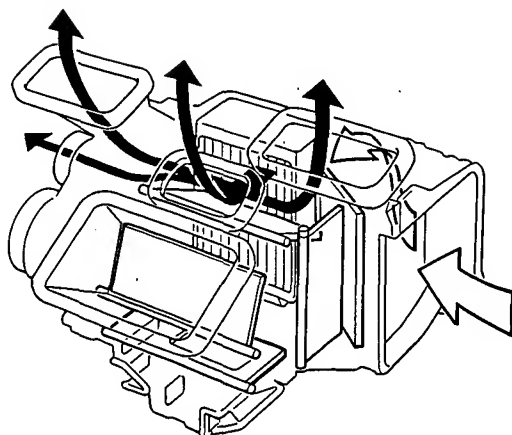
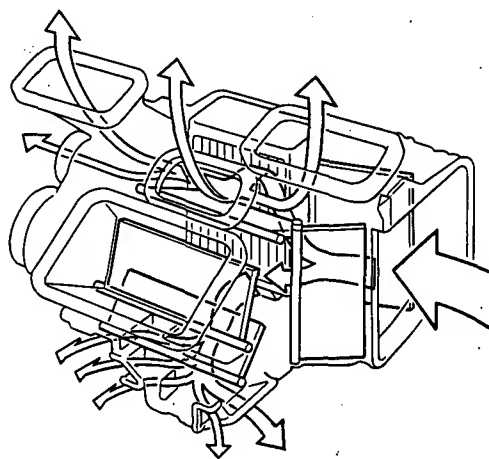
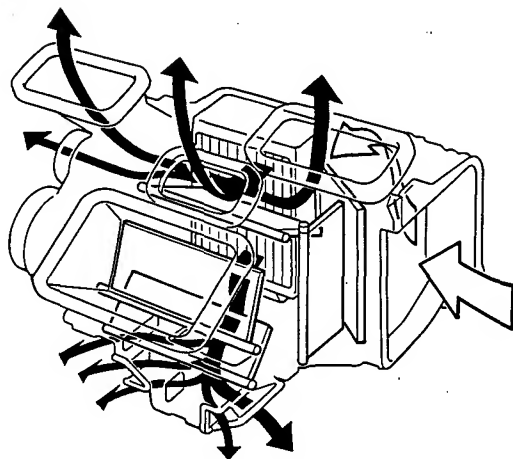
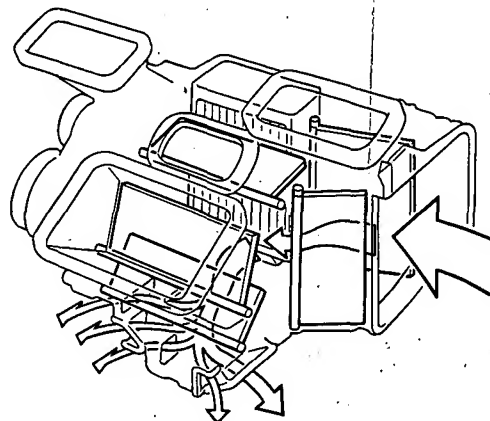
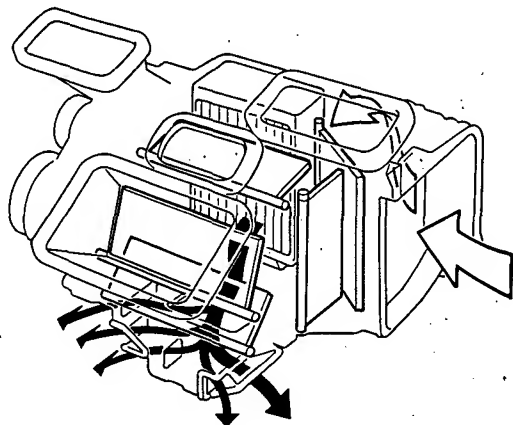


← HOT

← COOL







# Troubleshooting

## Symptom Chart

SYMPTOM		REMEDY
No hot air flow	Blower motor does not run	Follow the flowchart (see page 21-8)
	Blower motor runs	Check for the following: <ul style="list-style-type: none"> <li>• Clogged heater duct</li> <li>• Clogged blower outlet</li> <li>• Clogged heater valve</li> <li>• Faulty air mix door operation</li> <li>• Heater valve cable misadjusted (see page 21-16)</li> <li>• Air mix control cable misadjusted</li> <li>• Faulty thermostat (see section 10)</li> </ul>
Hot air flow is low	Blower motor running speed does not change	Follow the flowchart (see page 21-7)
	Blower runs properly	Check for the following: <ul style="list-style-type: none"> <li>• Clogged heater duct</li> <li>• Clogged blower outlet</li> <li>• Incorrect door position</li> </ul>

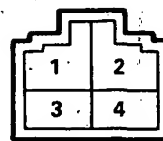


## Flowchart — Blower Motor Speed

Blower motor running speed does not change.

Disconnect the 4P connector from the blower resistor.

Measure the resistance between the 2 and 4 terminals of the blower resistor.



View from terminal side

Is there approx. 2.5  $\Omega$ ?

NO

Replace the blower resistor.

YES

Reconnect the 4P connector to the blower resistor.

Remove the heater control panel (see page 21-14).

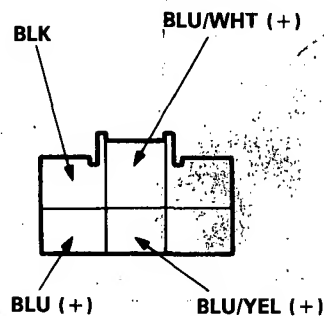
Disconnect the 6P connector from the heater fan switch.

Turn the ignition switch ON.

Measure voltage between:

- BLU/YEL wire terminal and body ground.
- BLU/WHT wire terminal and body ground.
- BLU wire terminal and body ground.

HEATER FAN SWITCH CONNECTOR



View from wire side

Is there battery voltage?

NO

Repair open in the BLU/YEL, BLU/WHT and/or BLU wire(s) between the heater fan switch and blower resistor.

YES

Check for continuity from BLK wire terminal to body ground.

Is there continuity?

NO

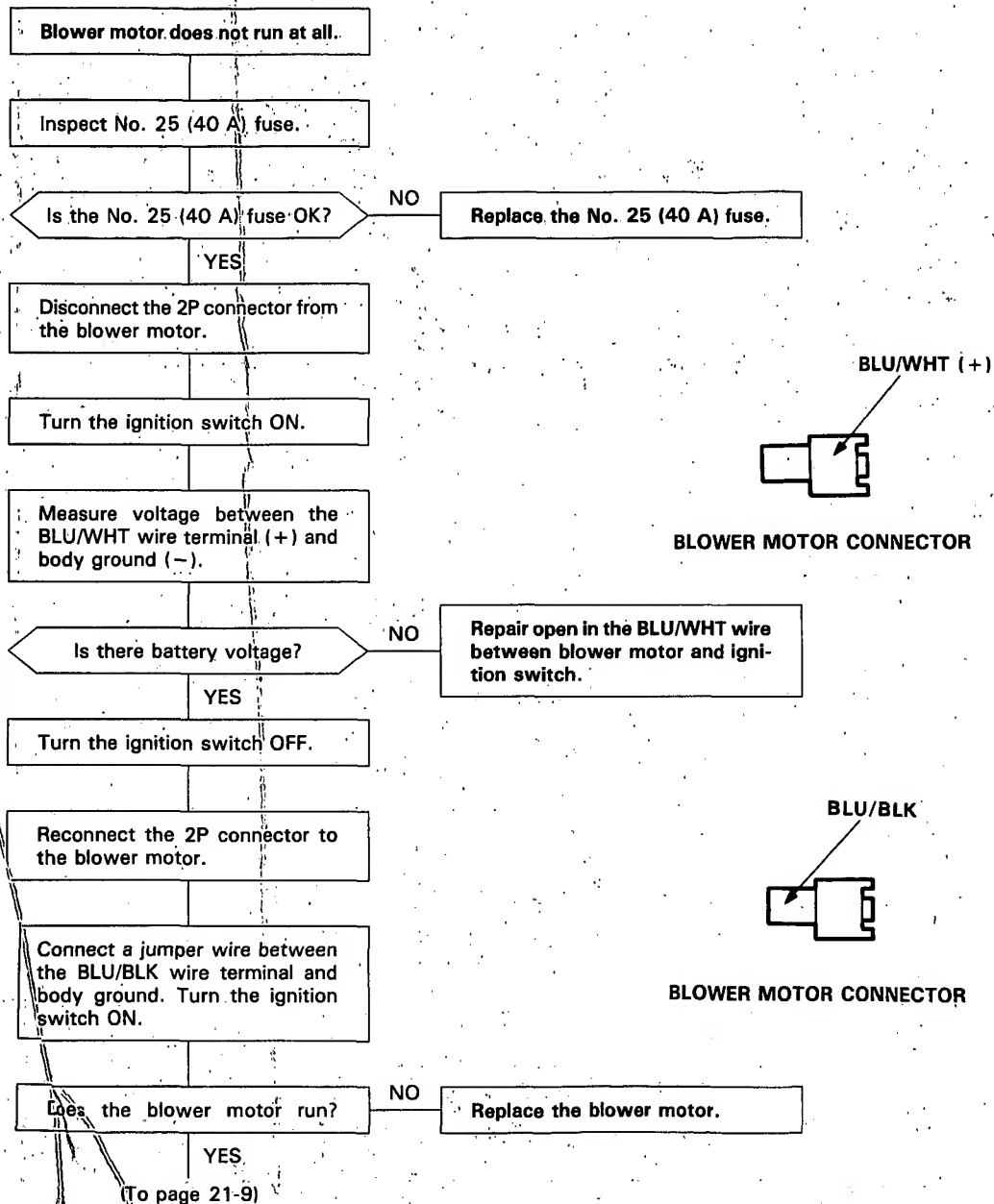
Repair open in the BLK wire between the heater fan switch and body ground. If the wire is OK, check for poor ground at G201.

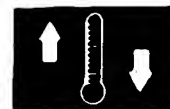
YES

Replace the heater fan switch.

# Troubleshooting

## Flowchart — Blower Motor





(From page 21-8)

Turn the ignition switch OFF.

Remove the jumper wire.

Remove the heater control panel (see page 21-14).

Disconnect the 6P connector from the heater fan switch.

Connect the jumper wire between the BLU/BLK wire terminal and body ground.

Turn the ignition switch ON.

Does the blower motor run?

NO

Repair open in the BLU/BLK wire between blower motor and heater fan switch.

YES

Turn the ignition switch OFF.

Remove the jumper wire.

Inspect the heater fan switch (see page 21-17).

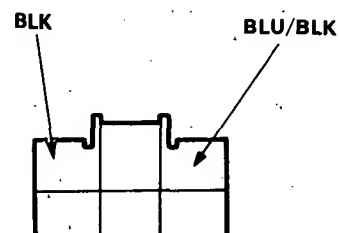
Is the heater fan switch OK?

NO

Replace the heater fan switch.

YES

Repair open in the BLK wire between the heater fan switch and body ground. If the wire is OK, check for poor ground at G201.

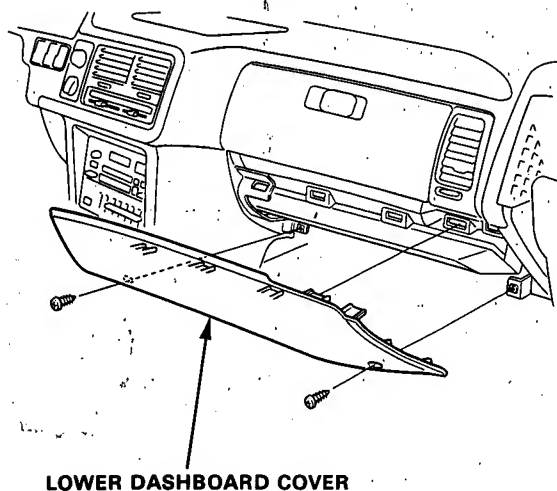


View from wire side.

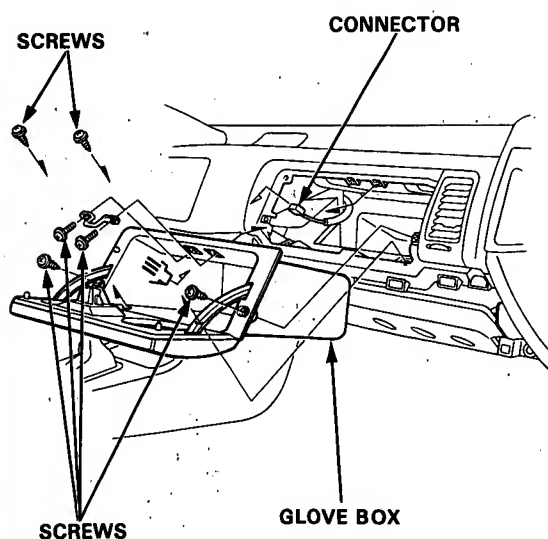
HEATER FAN SWITCH CONNECTOR

# Blower Unit Replacement

1. Remove the two screws and right lower dashboard cover.

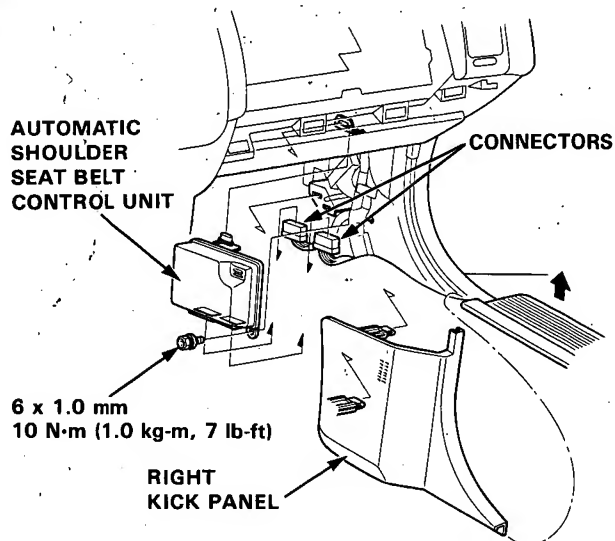


2. Remove the six screws, one connector and glove box.

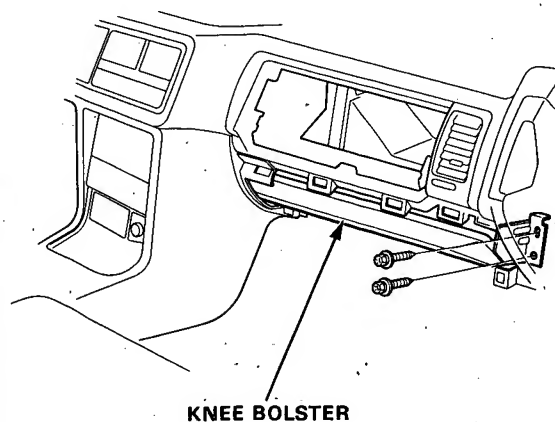


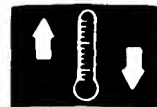
3. Remove the right kick panel.

USA: Remove the one bolt, two connectors and automatic shoulder seat belt control unit.  
CANADA: Remove the daytime running light relay.

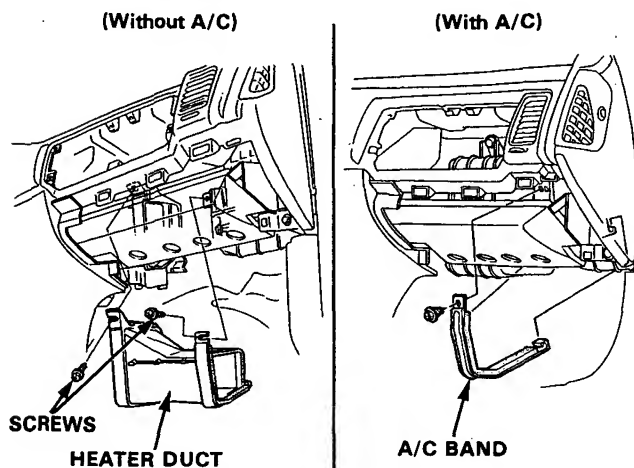


4. Remove the two bolts from the right side of the knee bolster.

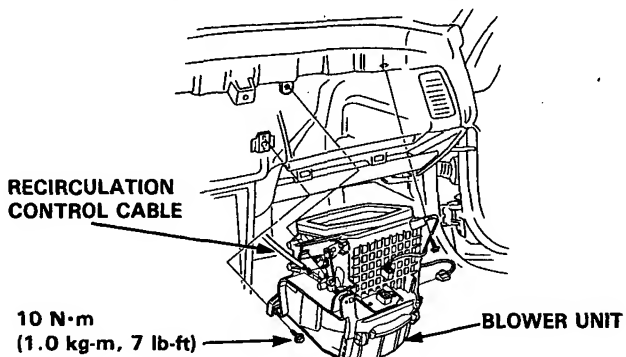




5. (Without A/C)  
Remove the two self-tapping screws and remove the heater duct.  
(With A/C)  
Remove the A/C band.

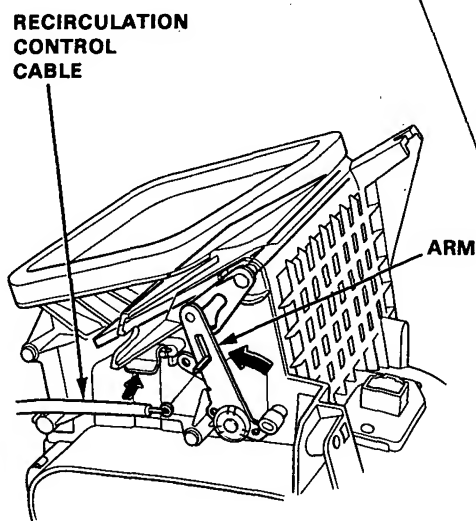


6. Remove the three blower mounting bolts.  
7. Disconnect the recirculation control cable. Disconnect the connectors from the blower motor and the blower resistor, then remove the blower unit.

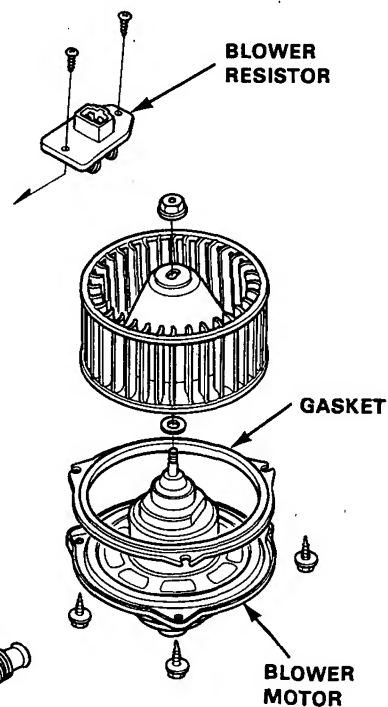
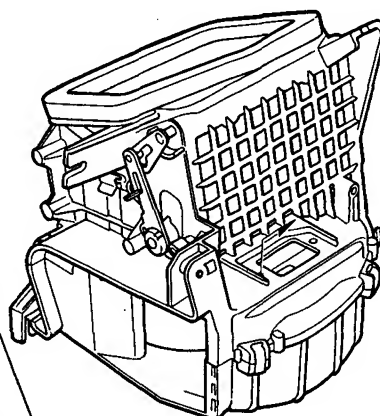


8. Install the blower in the reverse order of removal, then turn it on and make sure no air leaks from its inlet and outlet seams. Check the recirculation control lever slide smoothly through the full stroke from right to left.

## Overhaul



- **RECIRCULATION CONTROL CABLE ADJUSTMENT**  
Slide the recirculation control lever to "RECIRC". Then connect the control cable to the arm while holding the recirculation door shut.



- Before reassembly, make sure that the recirculation door and linkage move smoothly without binding.

# Heater Unit Replacement

1. When the engine is cool, drain engine coolant from the radiator (see section 10).

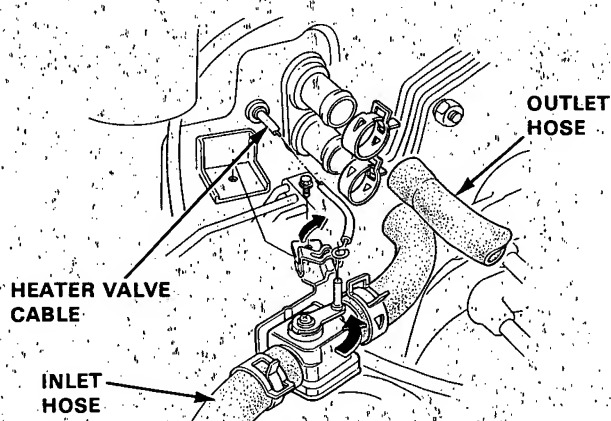
## ⚠ WARNING

- Do not remove the radiator cap when the engine is hot; the engine coolant is under pressure and could severely scald you.
- Keep hands away from the radiator fan. The fan may start automatically without warning and run for up to 30 minutes, even after the engine is turned off.

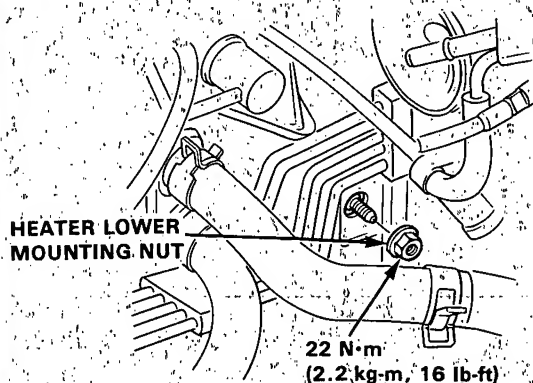
**CAUTION:** Engine coolant will damage paint. Quickly rinse any spilled engine coolant from painted surfaces.

2. Disconnect the heater valve cable from the heater valve.
3. Disconnect the heater hoses at the firewall.

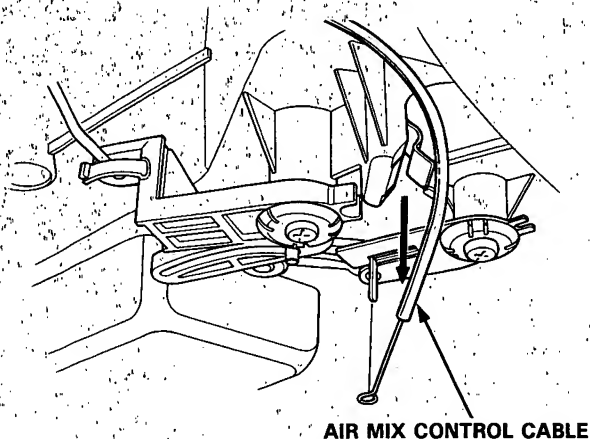
**NOTE:** Engine coolant will run out when the hoses are disconnected, drain it into a clean drip pan.



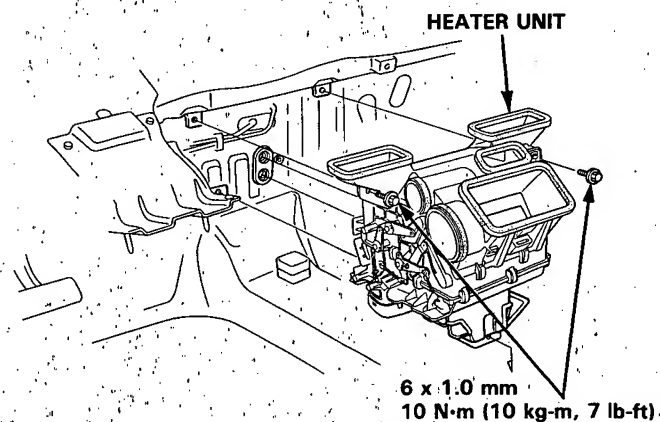
4. Remove the heater lower mounting nut on the engine side of the firewall.



5. Remove the heater control panel (see page 21-14).
6. Remove the dashboard (see section 20).
7. Remove the heater duct.
8. Disconnect the air mix control cable from the heater unit.



9. Remove the two mounting bolts, then remove the heater unit.



10. Install in the reverse order of removal, and:

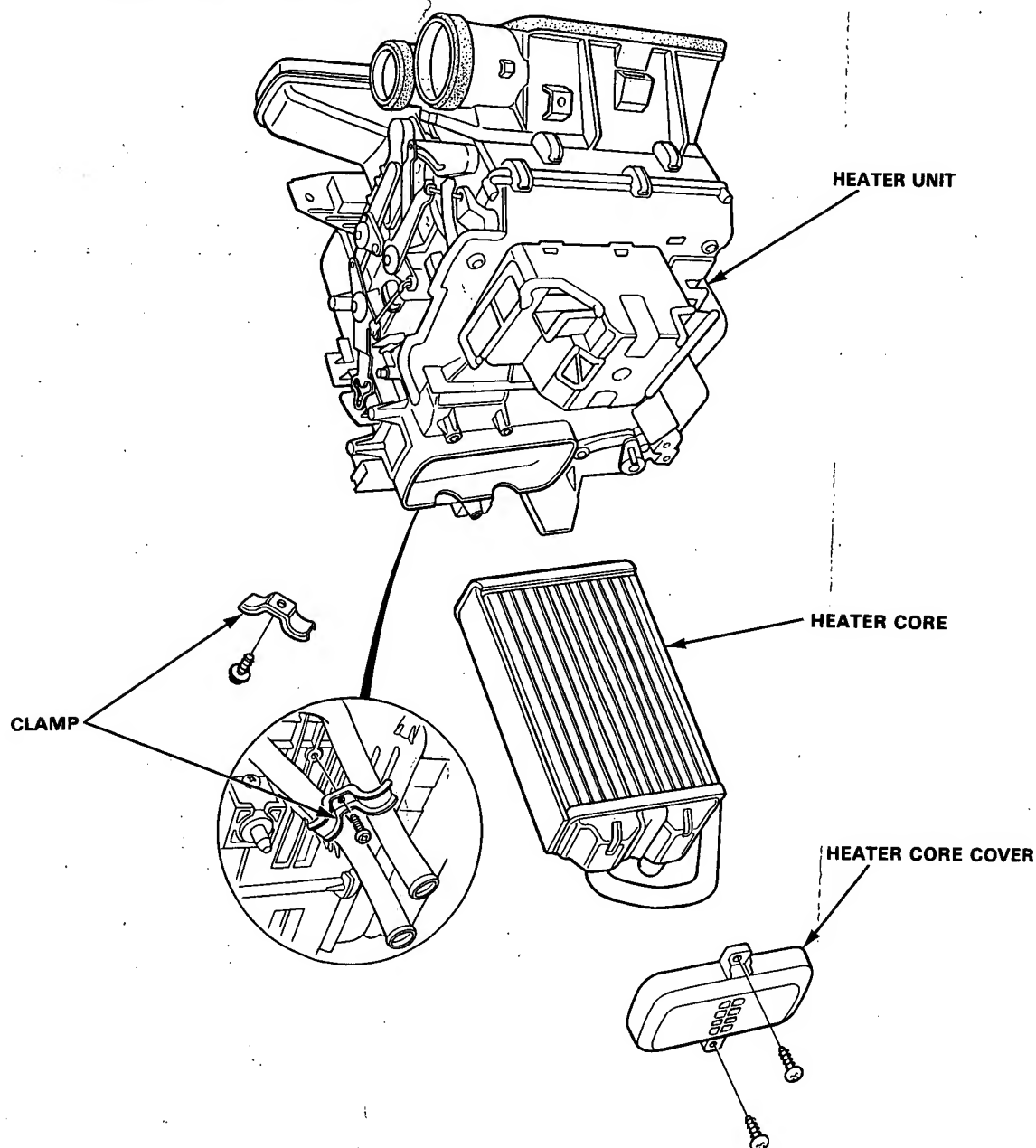
- Apply sealant to the grommets.
- Do not interchange the inlet and outlet hoses. Make sure that the hose clamps are secure.
- Loosen the bleed bolt on the engine, and refill the radiator and reservoir tank with the proper engine coolant mixture (see section 10). Tighten the bleed bolt when all the trapped air has escaped and engine coolant begins to flow from it (see section 10).
- Connect all cables, and make sure they are properly adjusted (see page 21-11, 21-16, 21-17).





## Overhaul

1. Remove the heater unit (see page 21-12).
2. Remove the two self-tapping screws and heater core cover.
3. Remove the self-tapping screw and clamp from heater core inlet and outlet tubes.
4. Pull out the heater core from the heater unit.



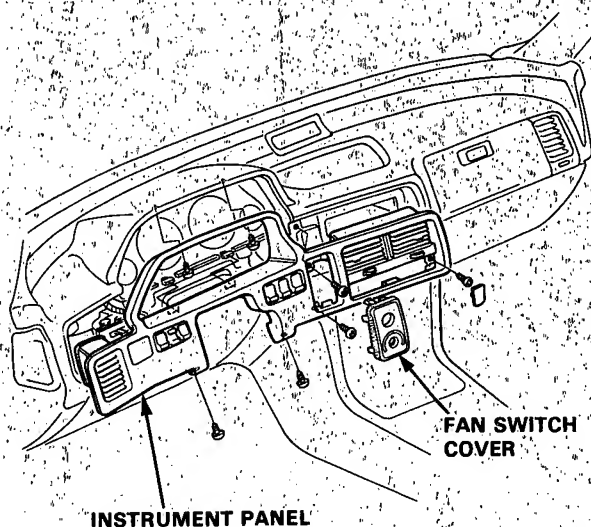
Install in the reverse order of removal and:

Loosen the bleed bolt on the engine and refill the radiator and reservoir tank with the proper engine coolant mixture. Tighten the bleed bolt when all the trapped air has escaped and engine coolant begins to flow from it (see section 10).

# Heater Control Panel

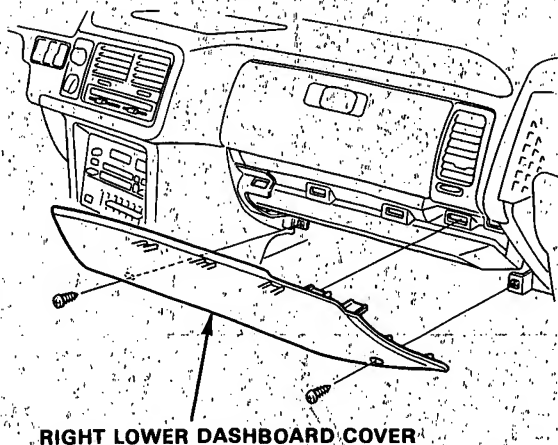
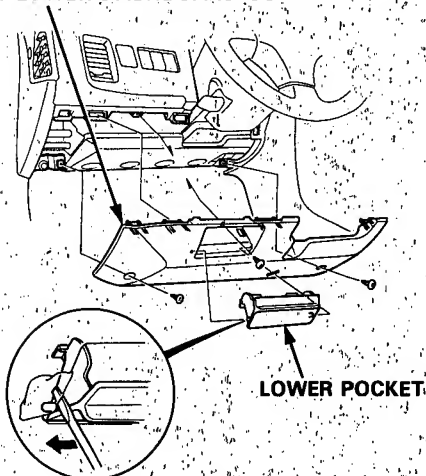
## Replacement

1. Remove the instrument panel (1 knob, 7 screws).

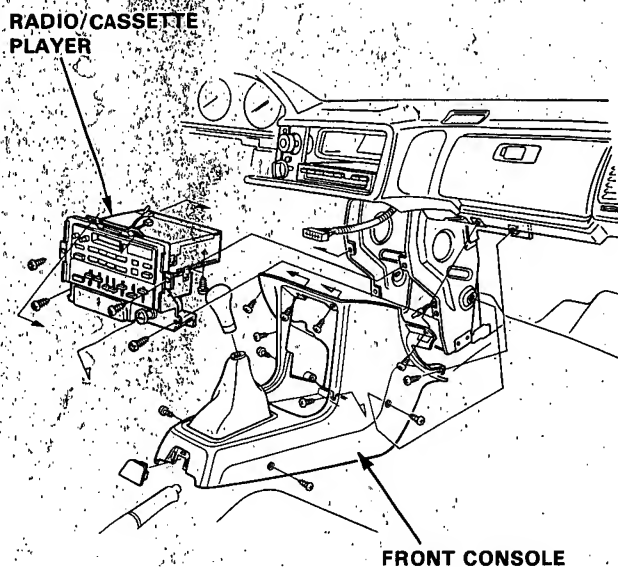


2. Remove the right and left lower dashboard covers.

LEFT LOWER DASHBOARD COVER

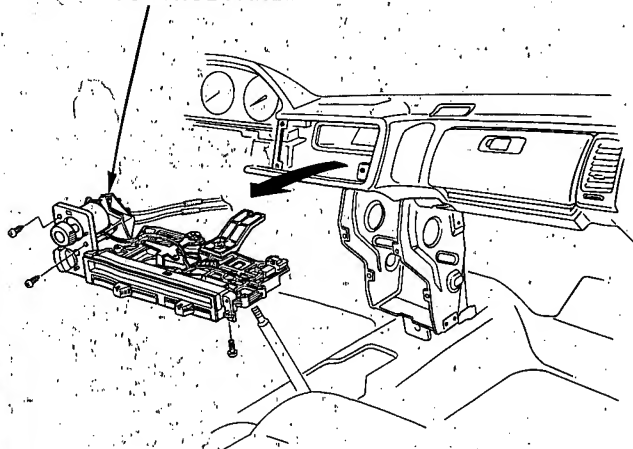


3. Remove the front console and radio/cassette player.



4. Disconnect the cables (heater valve cable, air mix control cable, mode control cable, recirculation control cable).
5. Remove the three self-tapping screws, pull out the heater control panel, disconnect the wire harness connectors, then remove the heater control panel.

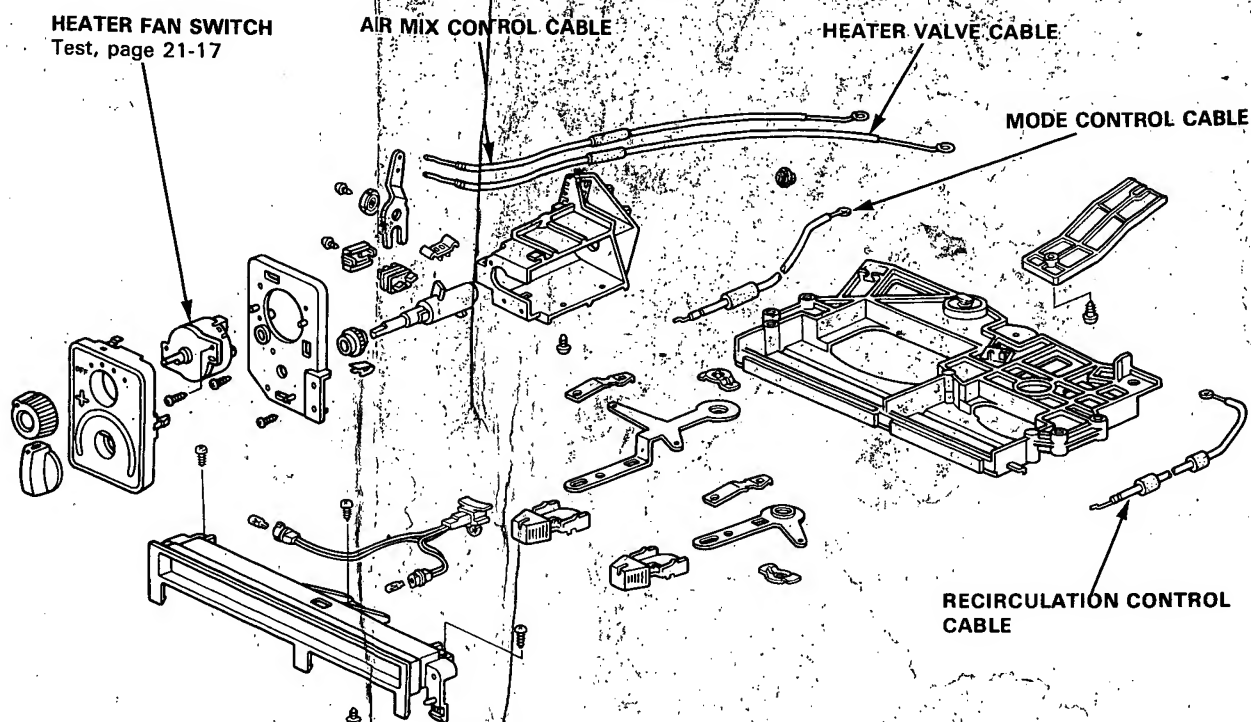
HEATER CONTROL PANEL



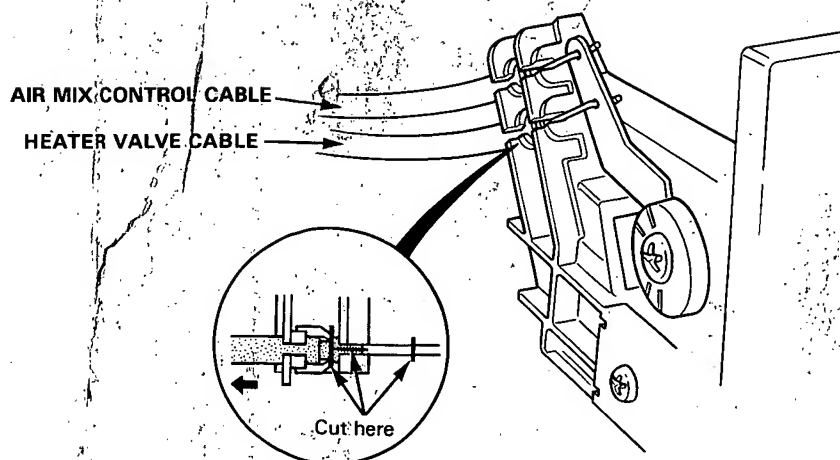
6. Install in the reverse order of removal, reconnect the cables, making sure they are properly adjusted (see page 21-11, 21-16, 21-17).



## Overhaul



1. Cut and remove the cable.
2. Install the new cable.

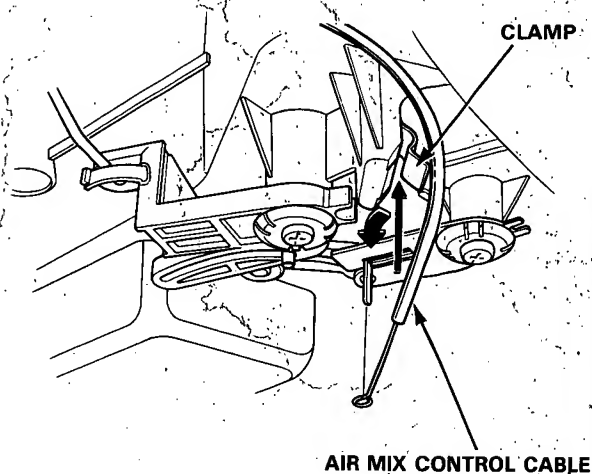


NOTE: After assembly check that the temperature control knob turns smoothly the full rotation.

# Heater Control Cables

## Air Mix Control Cable Adjustment

1. Turn the temperature control knob to COOL.
2. Move the air mix door shaft arm toward the front of the car and connect the end of the cable to the arm.

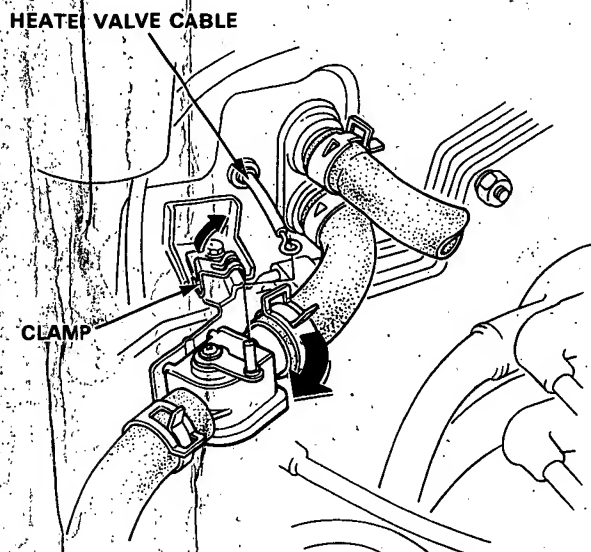


3. Gently slide the cable outer housing back from the end enough to take up any slack in the cable, but not enough to make the temperature control knob move, then snap the cable housing into the clamp.

**NOTE:** The heater valve cable should also be adjusted if the air mix control cable has been disconnected.

## Heater Valve Cable Adjustment

1. Turn the temperature control knob to COOL.
2. Gently slide the cable housing back from the end enough to take up any slack in the cable, but not enough to make the temperature control knob move, then hold the cable housing and snap it into the clamp.



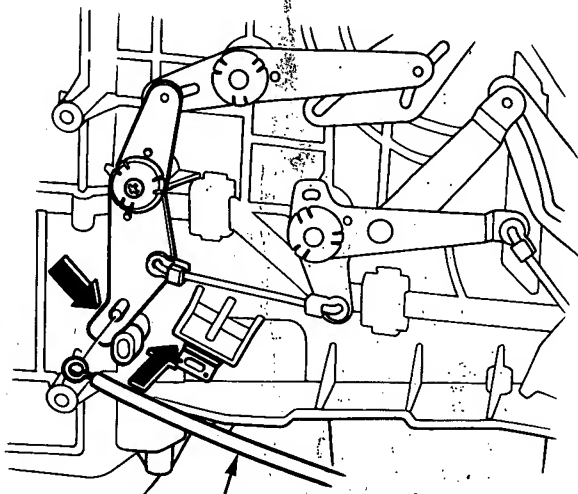
**NOTE:** The air mix control cable should also be adjusted if the heater valve cable has been disconnected.

# Heater Fan Switch



## Mode Control Cable Adjustment

1. Slide the mode control lever to DEF.
2. Turn the mode control shaft to the front, and connect the end of the cable to the arm.



MODE CONTROL CABLE

3. Gently slide the cable housing back from the end enough to take up any slack in the cable, but not enough to make the mode control lever move; then hold the cable housing, and snap it into the clamp.

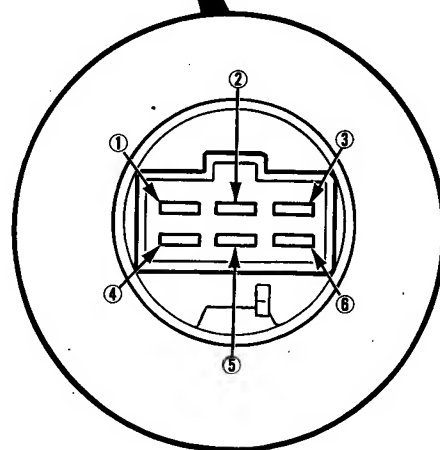
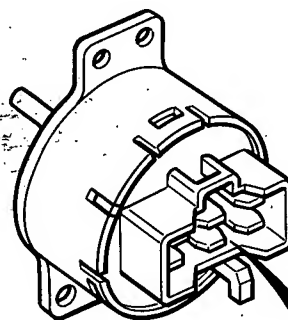
## Test

1. Disconnect the 6P connector from the heater fan switch.
2. Check for continuity between the terminals of the heater fan switch according to the table below.

### SWITCH CONNECTION

Terminal	1	2	3	4	5	6
Position						
OFF						
•			○		○	○
•		○			○	○
•	○				○	○
•				○	○	○

3. If continuity is not correct, replace the heater fan switch.



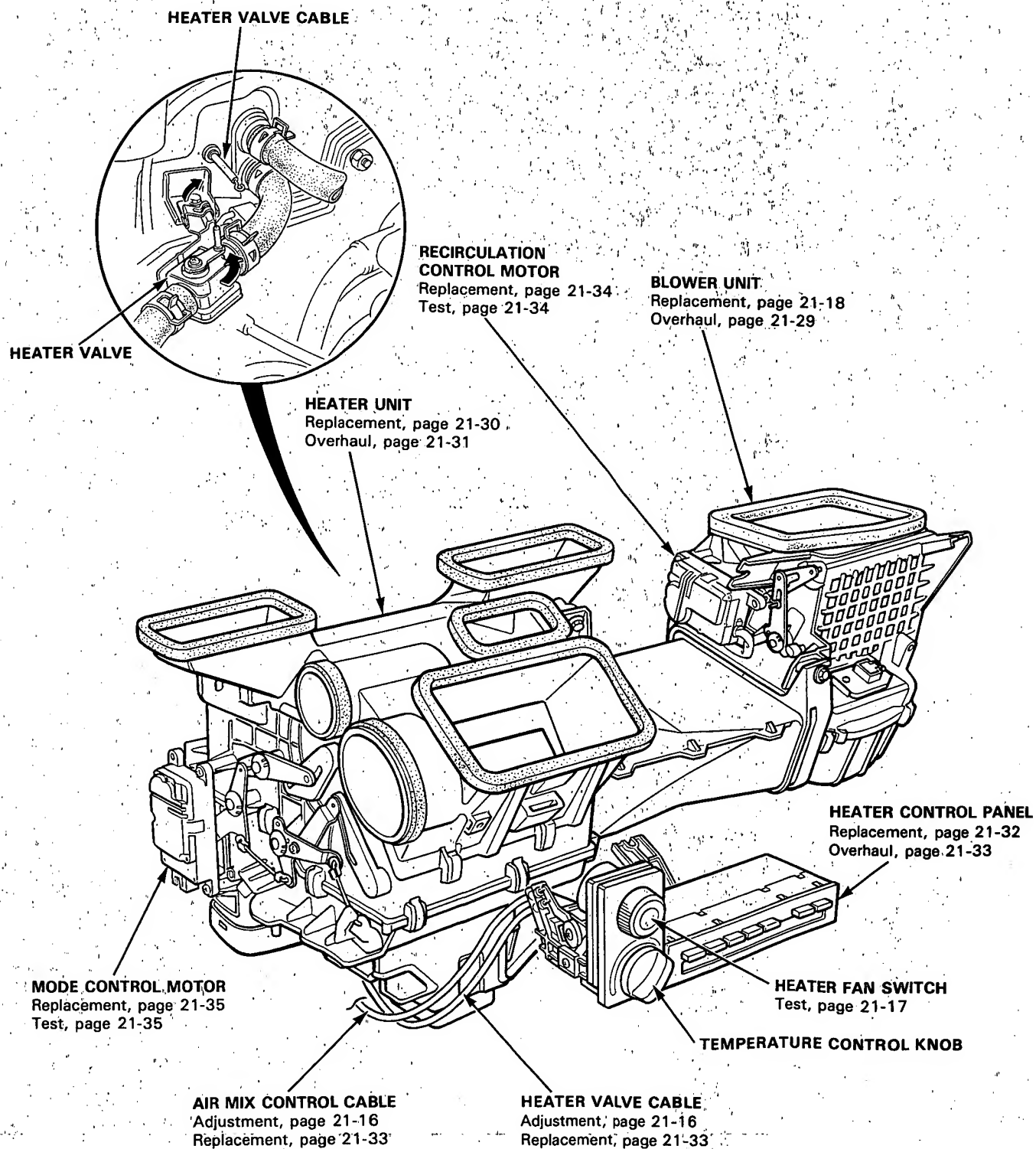


## **Heter (Button Type)**

<b>Illustrated Index .....</b>	<b>21-20</b>
<b>Troubleshooting</b>	
<b>Symptom Chart .....</b>	<b>21-21</b>
<b>Circuit Diagram .....</b>	<b>21-22</b>
<b>Flowcharts</b>	
<b>Recirculation Control Motor .....</b>	<b>21-24</b>
<b>Mode Control Motor .....</b>	<b>21-26</b>
<b>Blower Unit</b>	
<b>Replacement .....</b>	<b>21-28</b>
<b>Overhaul .....</b>	<b>21-29</b>
<b>Heater Unit</b>	
<b>Replacement .....</b>	<b>21-30</b>
<b>Overhaul .....</b>	<b>21-31</b>
<b>Heater Control Panel</b>	
<b>Replacement .....</b>	<b>21-32</b>
<b>Overhaul .....</b>	<b>21-33</b>
<b>Recirculation Control Motor</b>	
<b>Replacement .....</b>	<b>21-34</b>
<b>Test .....</b>	<b>21-34</b>
<b>Mode Control Motor</b>	
<b>Replacement .....</b>	<b>21-35</b>
<b>Test .....</b>	<b>21-35</b>



# Illustrated Index





# Troubleshooting

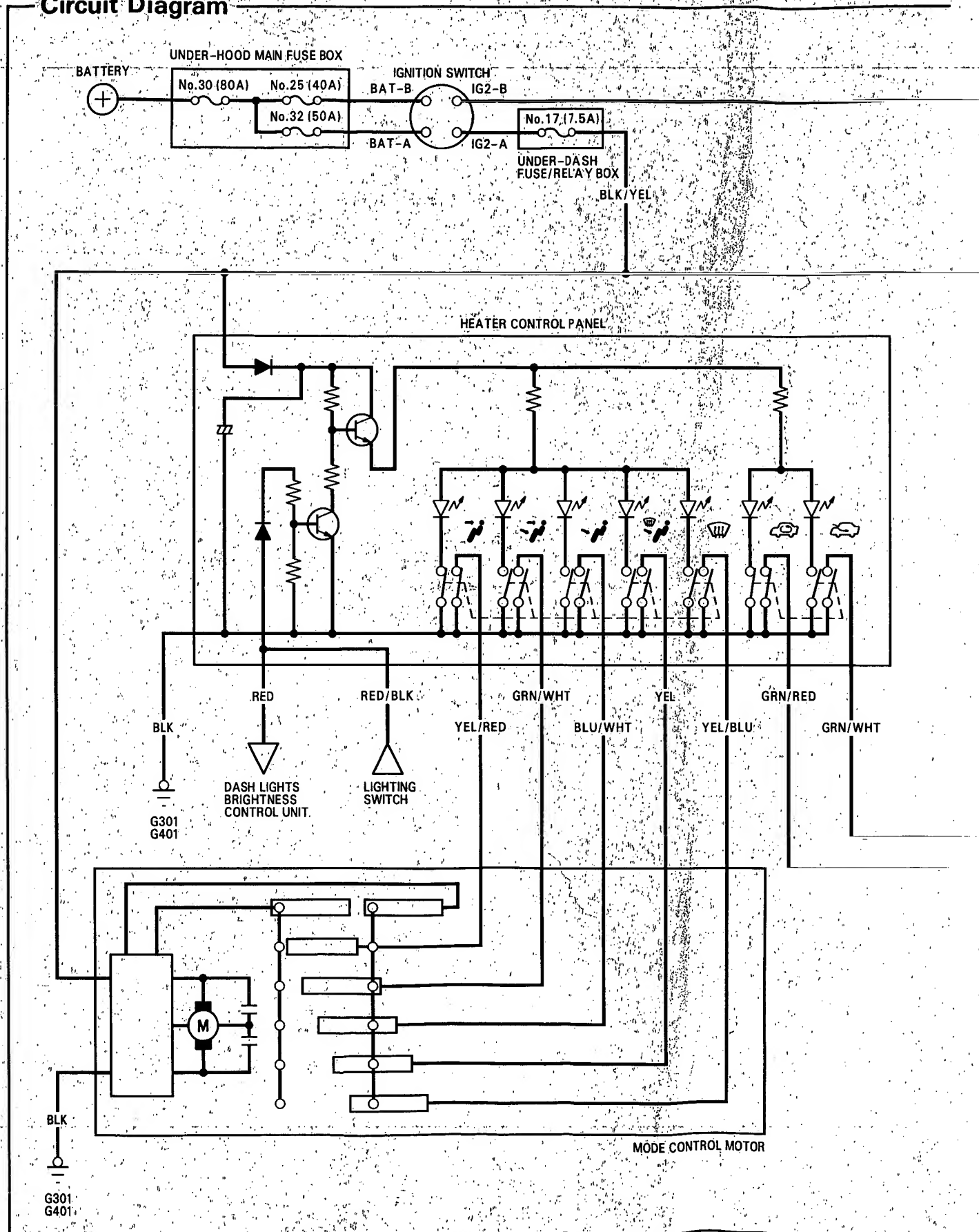
## Symptom Chart

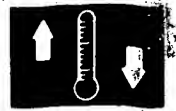


SYMPTOM		REMEDY
No hot air flow	Blower motor does not run	Follow the flowchart (see page 21-8, 9)
	Blower motor runs	Check for following: <ul style="list-style-type: none"> <li>• Clogged heater duct</li> <li>• Clogged blower outlet</li> <li>• Clogged heater valve</li> <li>• Faulty air mix door operation</li> <li>• Air mix control cable misadjusted</li> <li>• Faulty thermostat (see section 10)</li> </ul>
Hot air flow is low	Blower motor running speed does not change	Follow the flowchart (see page 21-7)
	Blower runs properly	Check for following: <ul style="list-style-type: none"> <li>• Clogged heater duct</li> <li>• Clogged blower outlet</li> <li>• Incorrect door position</li> </ul>
Recirculation	Recirculation control door does not change between FRESH and REC.	Follow the flowchart (see page 21-24)
	Recirculation motor runs	Check the door linkage and the blower.
Mode does not change	Mode control motor does not run	Follow the flowchart (see page 21-26)
	Mode control motor runs	Check the heater door linkage and the heater unit.

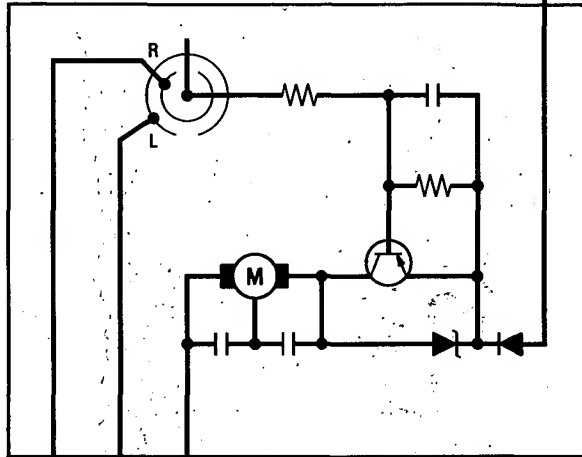
# Troubleshooting

## Circuit Diagram





RECIRCULATION CONTROL MOTOR



GRN/WHT  
GRN/RED

G301  
G401

BLU/WHT



BLOWER  
MOTOR

BLU/BLK

BLOWER  
RESISTOR



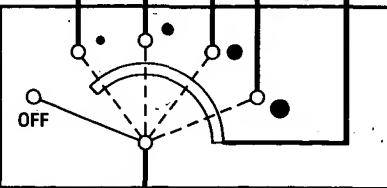
BLU

BLU/WHT

BLU/YEL

BLU/BLK

A/C SWITCH



HEATER FAN SWITCH

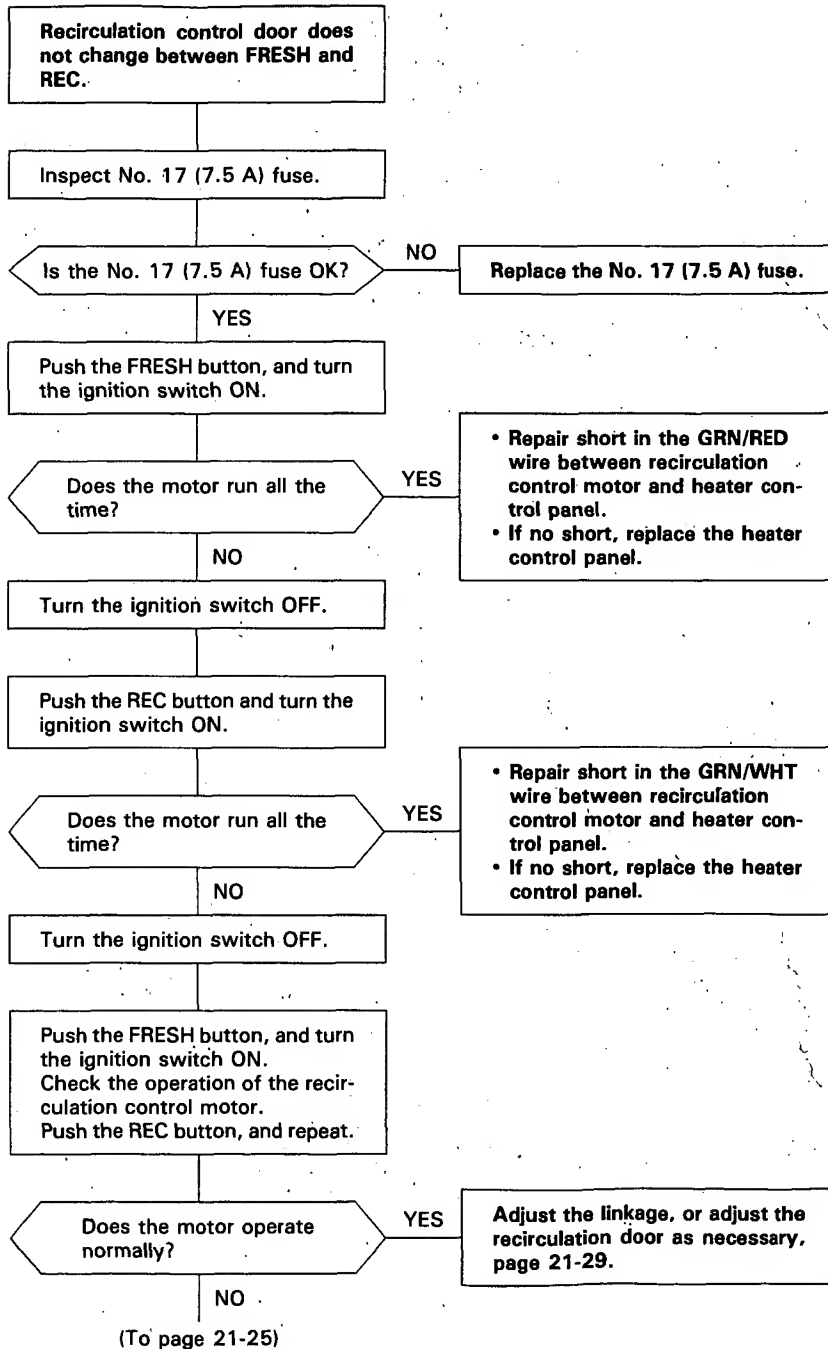
BLK

G201

# Troubleshooting

## Flowchart — Recirculation Control Motor

First, check the operation of the mode control motor. If it runs, No. 17 (7.5 A) fuse is OK.





(From page 21-24)

Disconnect the 4P connector from the recirculation control motor at the bottom of the blower unit.

Turn the ignition switch ON.

Measure the voltage between the BLK/YEL wire terminal (+) and body ground (-).

Is there battery voltage?

NO

Repair open in the BLK/YEL wire between the under-dash fuse/relay box and recirculation control motor.

YES

Turn the ignition switch OFF.

Check for continuity between the BLK wire terminal and body ground.

Is there continuity?

NO

Repair open in the BLK wire between the recirculation control motor and body ground. If the wire is OK, check for poor ground at G301, G401.

YES

Check GRN/WHT wire for continuity to body ground in FRESH position.

Is there continuity?

NO

- Repair open in the GRN/WHT wire between the recirculation control motor and heater control panel.
- Check the heater control panel.

YES

Check GRN/RED wire for continuity to body ground in REC position.

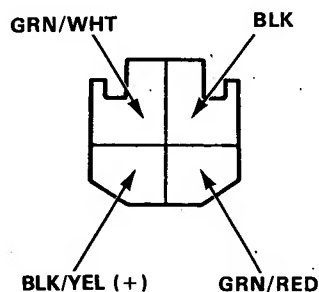
Is there continuity?

NO

- Repair open in the GRN/RED wire between the recirculation control motor and heater control panel.
- Check the heater control panel.

YES

Replace the recirculation control motor.



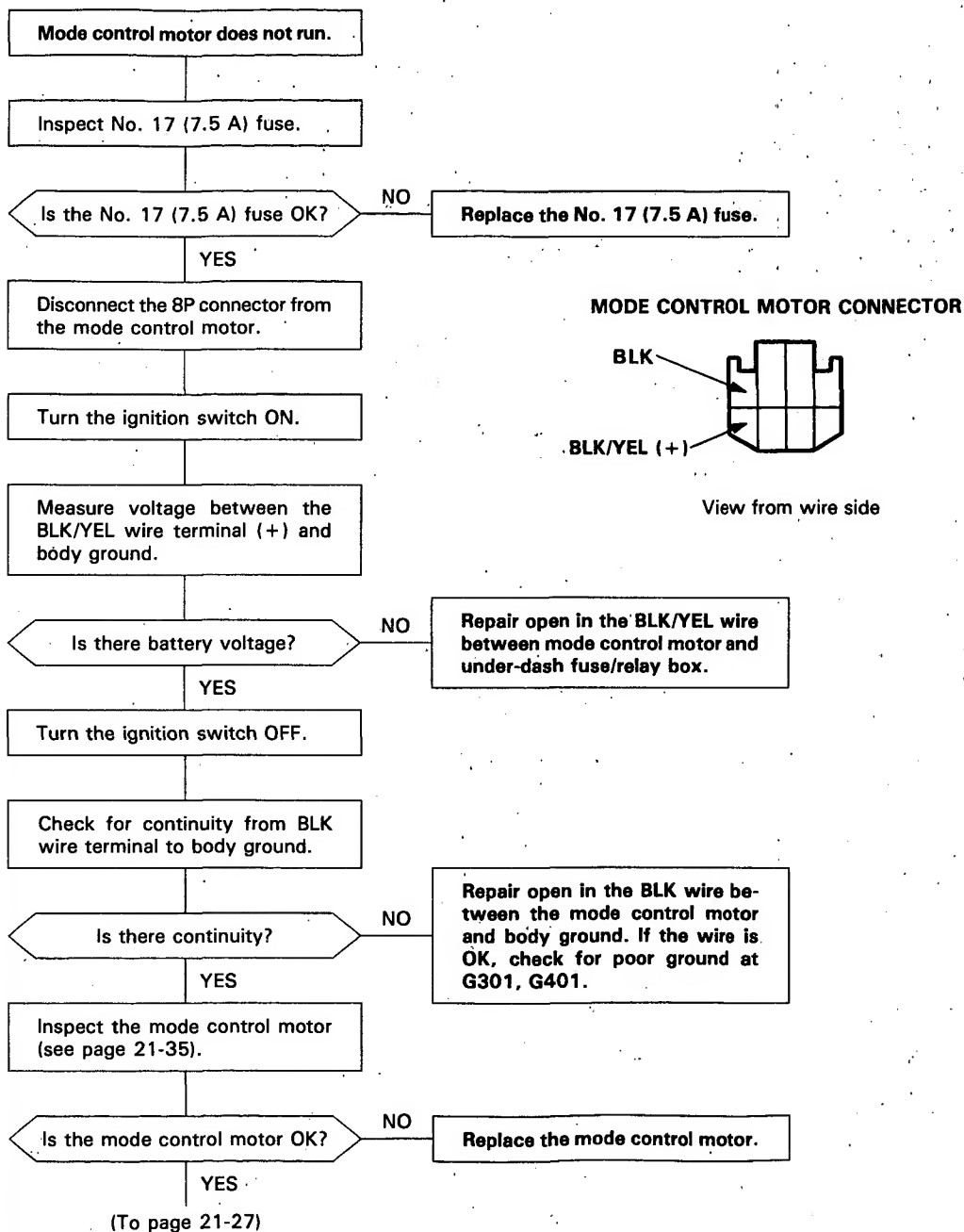
View from wire side

RECIRCULATION CONTROL MOTOR CONNECTOR

# Troubleshooting

## Flowchart — Mode Control Motor

First, check the operation of the recirculation control motor. If it runs, No. 17 (7.5 A) fuse is OK.





(From page 21-26)

Disconnect the 14P connector from the heater control panel.

Check for continuity at each wire (BLU/WHT, GRN/WHT, YEL, YEL/RED, YEL/BLU) between the 8P and 14P connectors.

Is there continuity?

NO

Repair any open in the wire(s) between the mode control motor and heater control panel.

YES

Check for continuity from each wire (BLU/WHT, GRN/WHT, YEL/RED, YEL/BLU, YEL) to body ground.

Is there continuity?

YES

Repair short to body ground in problem wire.

NO

Check the same wires for voltage.

Is there any voltage?

YES

Repair short to power. This short causes damage to the heater control panel.

NO

Check for continuity between the BLK wire terminal and body ground.

Is there continuity?

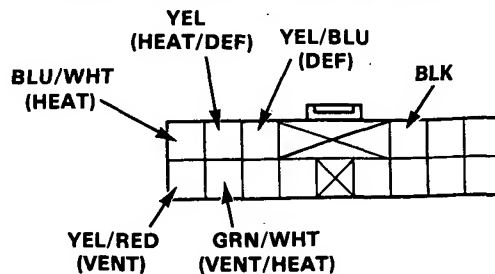
NO

Repair open in the BLK wire between heater control panel and body ground. If the wire is OK, check for poor ground at G301, G401.

YES

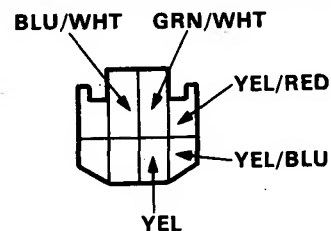
Replace the heater control panel.

#### HEATER CONTROL PANEL CONNECTOR



View from wire side

#### MODE CONTROL MOTOR CONNECTOR



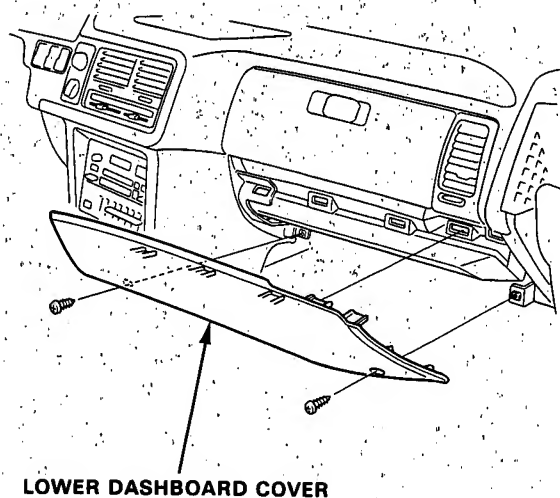
View from wire side

NOTE: If any of the wires are shorted to ground, the mode control motor will not change positions.

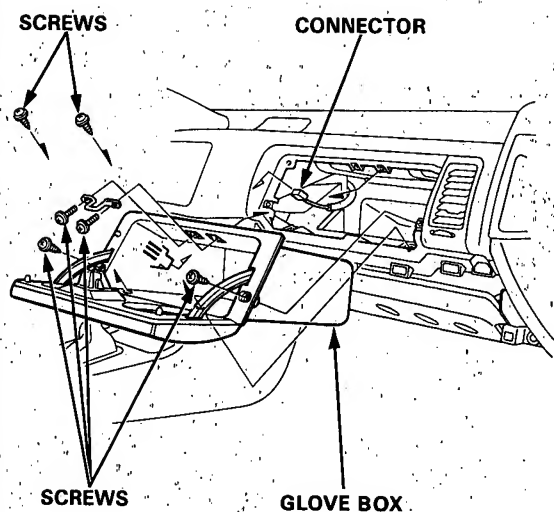
# Blower Unit

## Replacement

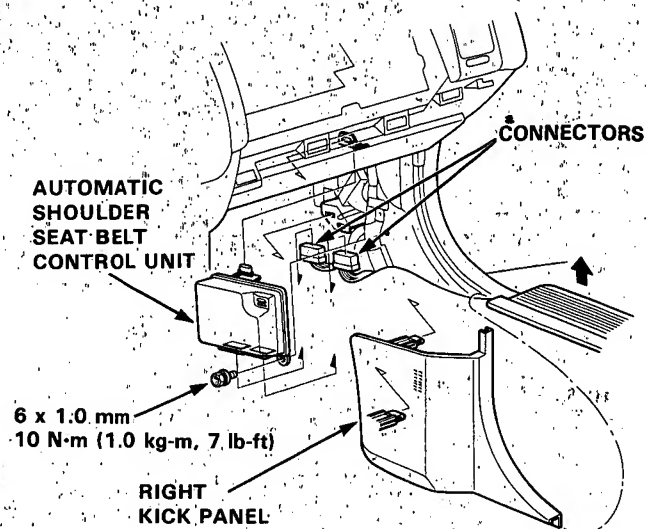
1. Remove the two screws and right lower dashboard cover.



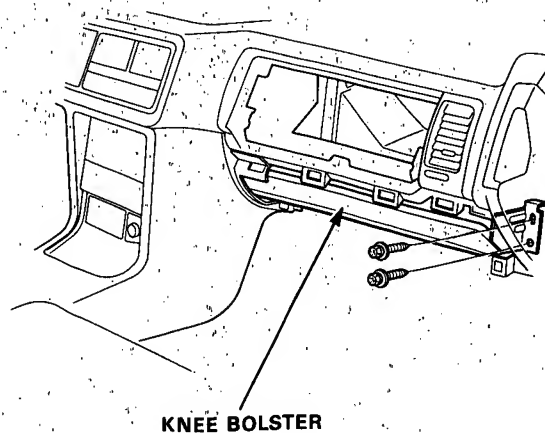
2. Remove the six screws, one connector and glove box.



3. Remove the right kick panel.  
USA: Remove the one bolt, two connectors and automatic shoulder seat belt control unit.  
CANADA: Remove the daytime running light relay.



4. Remove the two bolts from the right side of the knee bolster.





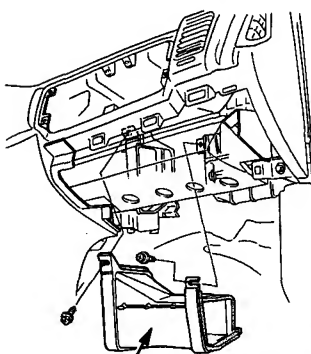


5. (Without A/C) :  
Remove the two self-tapping screws and remove the heater duct.

(With A/C)

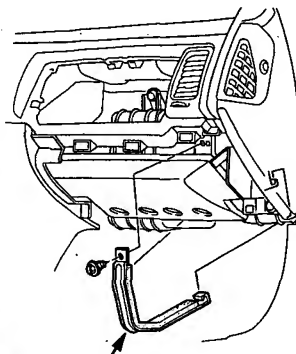
Remove the A/C band.

(Without A/C)



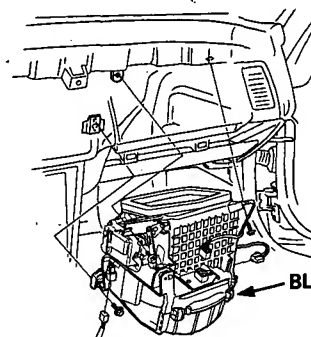
HEATER DUCT

(With A/C)



A/C BAND

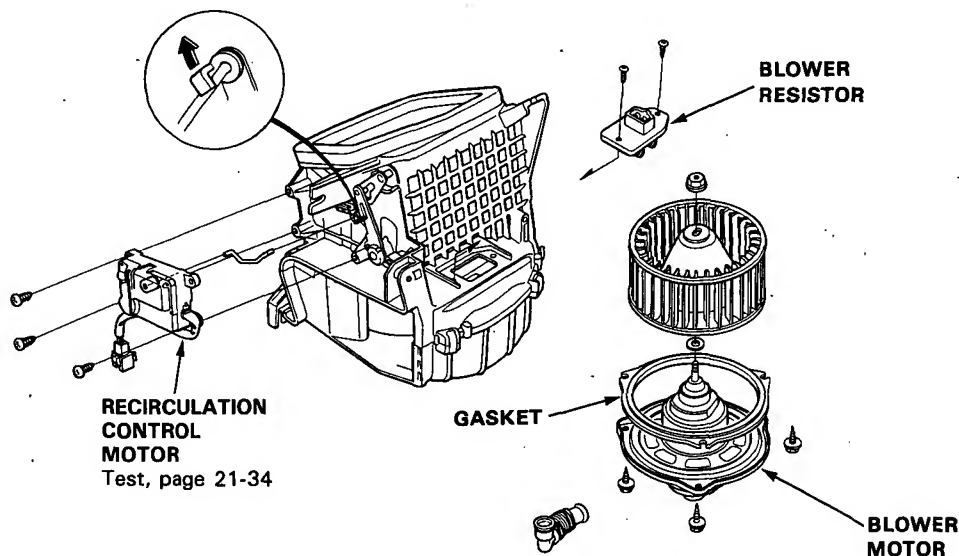
6. Remove the three blower mounting bolts.
7. Disconnect the connectors from the blower motor, resistor and recirculation control motor, then remove the blower unit.



BLOWER UNIT

8. Install the blower in the reverse order of removal, then turn it on and make sure no air leaks from its inlet and outlet seams.
- After installation, make sure the recirculation control motor and blower motor operates smoothly.

## Overhaul



- Before reassembly, make sure that the recirculation door and linkage moves smoothly without binding.
- Recirculation Control Motor Adjustment.  
When reattaching the actuator, make sure its positioning will not allow the air door to be pulled too far. Attach the actuator and all linkage, then apply battery voltage and watch the door movement. If necessary, loosen the holding screw and move the actuator up or down.

### To adjust the recirculation door:

Connect the recirculation control motor connector to the main wire harness, push the RECIRC button and turn on the ignition switch.

Then connect the control rod to the arm while holding the recirculation door closed.

# Heater Unit

## Replacement

1. When the engine is cool, drain engine coolant from the radiator (see section 10).

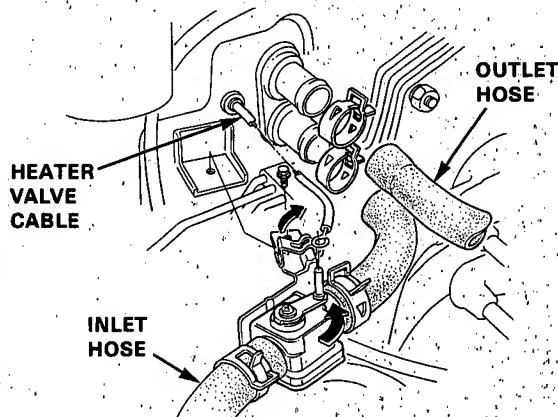
### ⚠ WARNING

- Do not remove the radiator cap when the engine is hot, the engine coolant is under pressure and could severely scald you.
- Keep hands away from the radiator fan. The fan may start automatically without warning and run for up to 30 minutes, even after the engine is turned off.

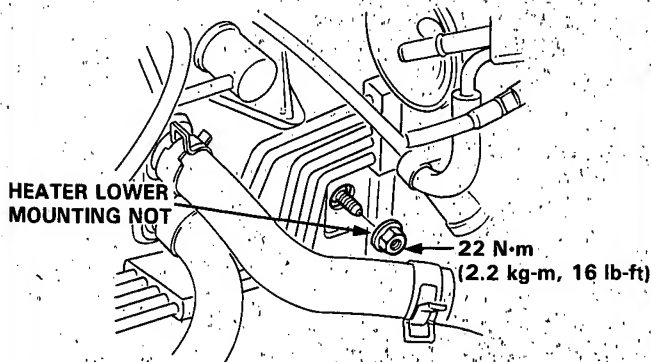
**CAUTION:** Engine coolant will damage paint. Quickly rinse any spilled engine coolant from painted surfaces.

2. Disconnect the heater valve cable from the heater valve.
3. Disconnect the heater hoses at the firewall.

**NOTE:** Engine coolant will run out when the hoses are disconnected; drain it into a clean drip pan.



4. Remove the heater lower mounting nut on the engine side of the firewall.



5. Remove the dashboard (see section 20).

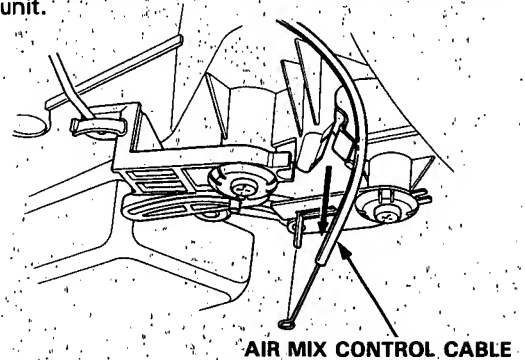
**NOTE:** The radio may have a coded theft protection circuit. Be sure to get the customer's code number before

- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse.
- Removing the radio.

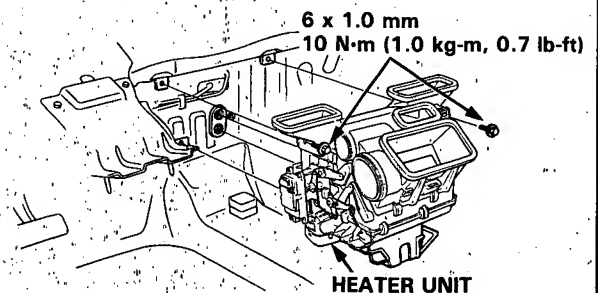
After service, reconnect power to the radio and turn it on.

When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

6. Remove the heater duct.
7. Disconnect the air mix control cable from the heater unit.



8. Remove the two heater mounting bolts, disconnect the wire harness connector from the mode control motor, and then remove the heater unit.



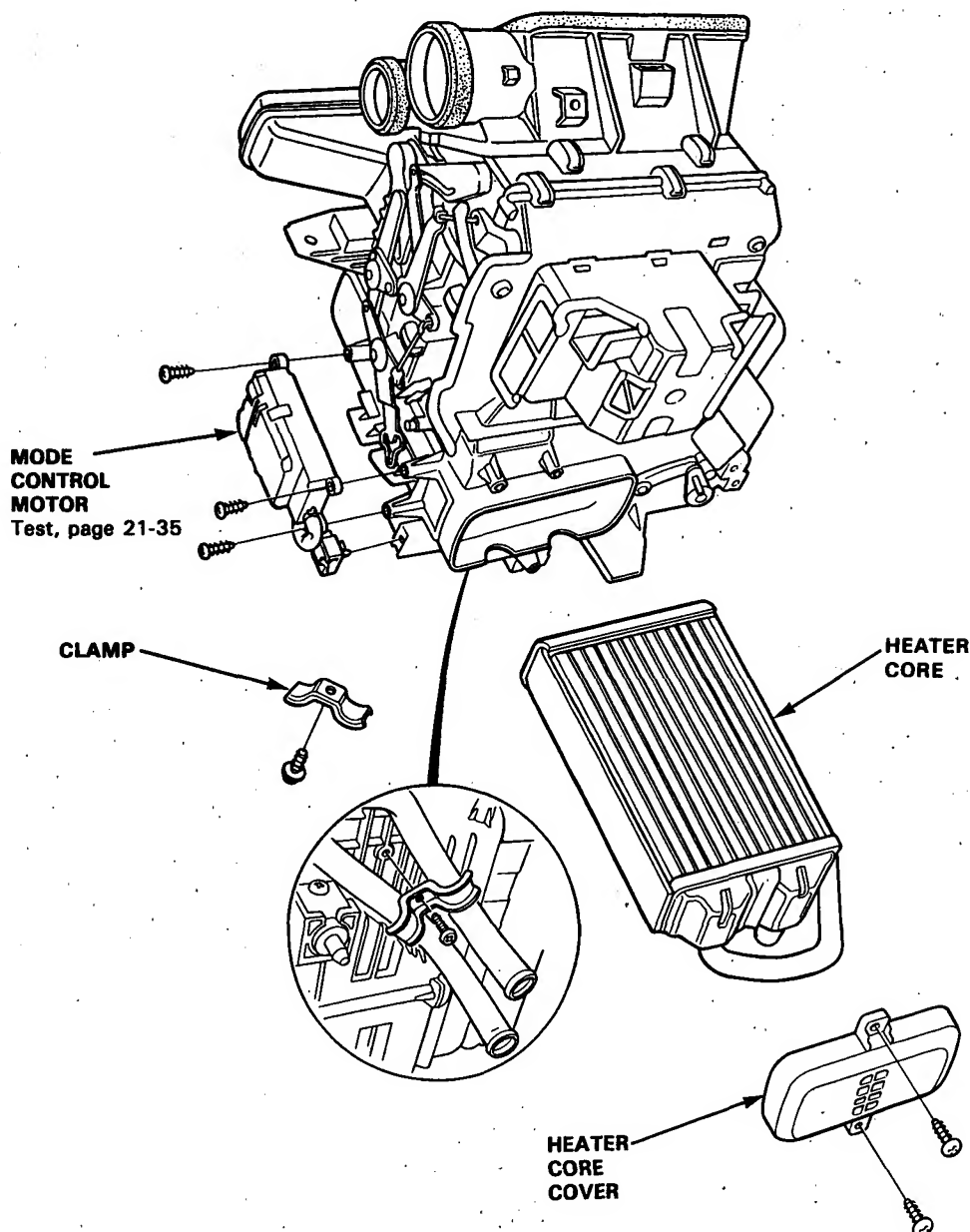
9. Install in the reverse order of removal, and

- Apply a sealant to the grommets.
- Do not interchange the inlet and outlet hoses. Make sure that the hose clamps are secure.
- Loosen the bleed bolt on the engine, and refill the radiator and reservoir tank with the proper engine coolant mixture (see section 10). Tighten the bleed bolt when all the trapped air has escaped and engine coolant begins to flow from it (see section 10).
- Connect all cables, and make sure they are properly adjusted (see page 21-16).



## Overhaul

1. Remove the heater unit (see page 21-30).
2. Remove the two self-tapping screws and heater core cover.
3. Remove the self-tapping screw and clamp from heater core inlet and outlet tubes.
4. Pull out the heater core from the heater unit.
5. Remove the mode control motor if necessary.



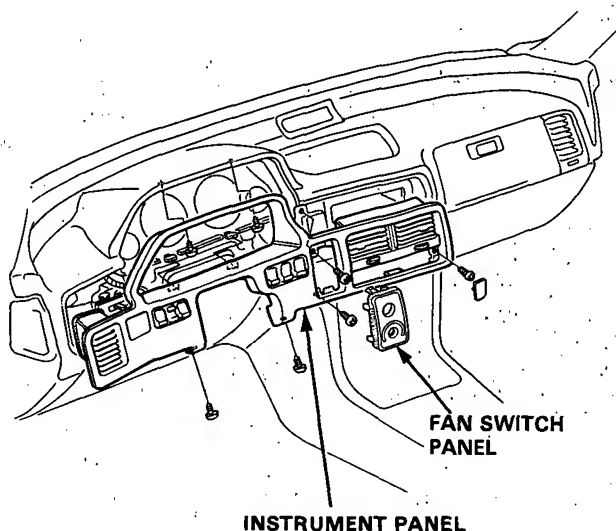
Install in the reverse order of removal and:

Loosen the bleed bolt on the engine and refill the radiator and reservoir tank with the proper engine coolant mixture. Tighten the bleed bolt when all the trapped air has escaped and engine coolant begins to flow from it.

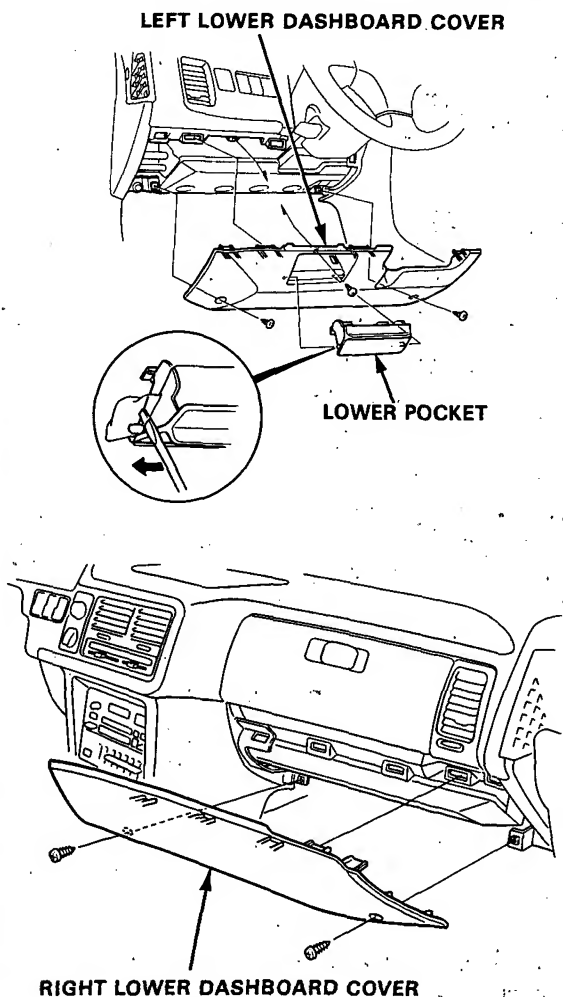
# Heater Control Panel

## Replacement

1. Remove the instrument panel (1 knob, 7 screws).



2. Remove the right and left lower dashboard covers.



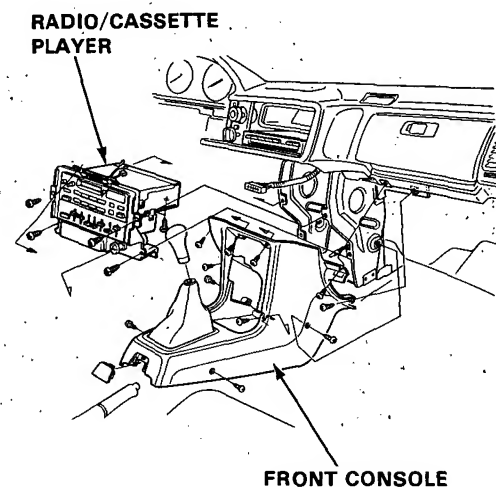
3. Remove the front console and the radio/cassette player.

**NOTE:** The radio may have a coded theft protection circuit. Be sure to get the customer's code number before

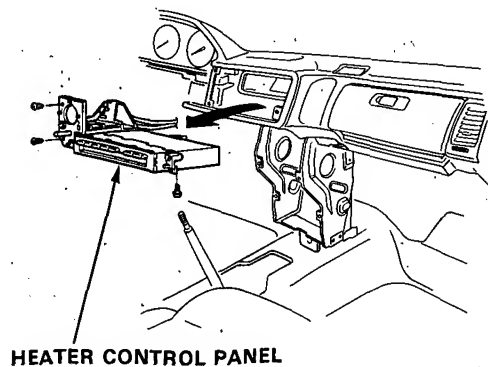
- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse (in the under-dash fuse/relay box).
- Removing the radio.

it on.

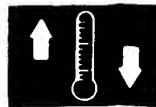
When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.



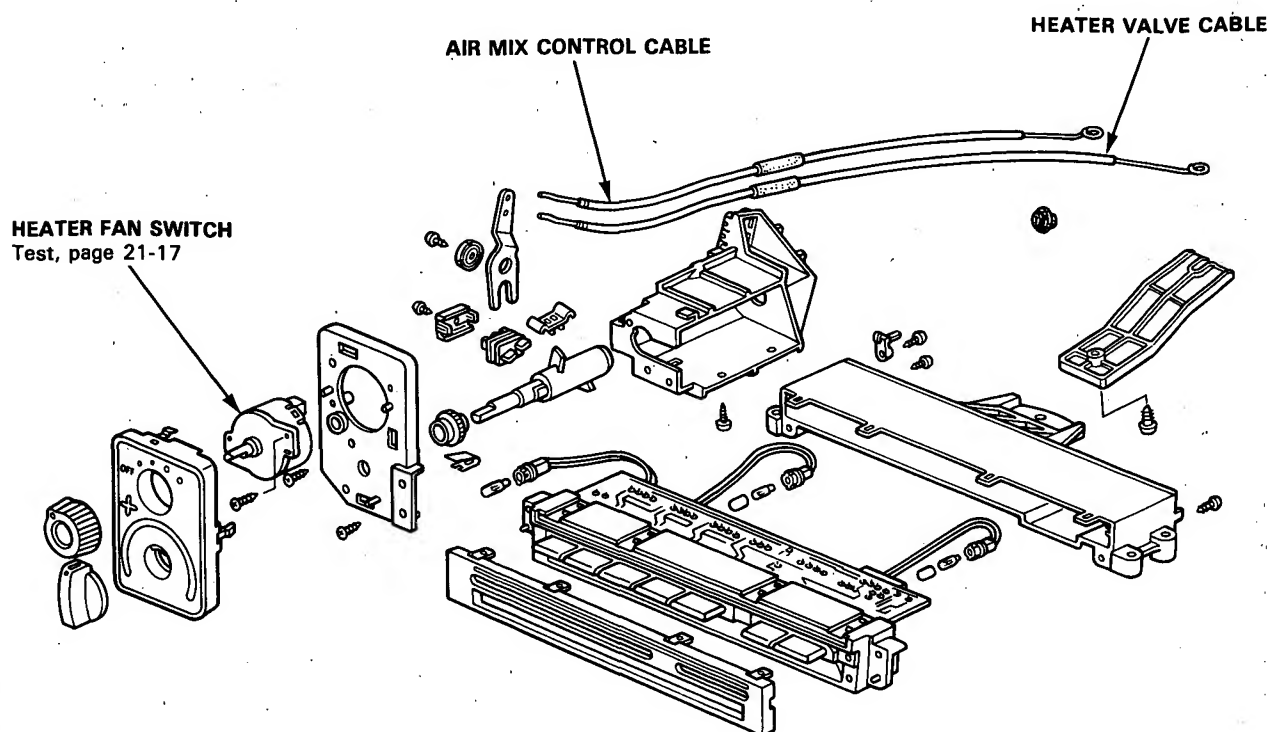
4. Disconnect the cables (heater valve cable, air mix control cable).
5. Remove the three self-tapping screws and setting plate, then disconnect the wire harness connectors and cables. Remove the heater control panel.



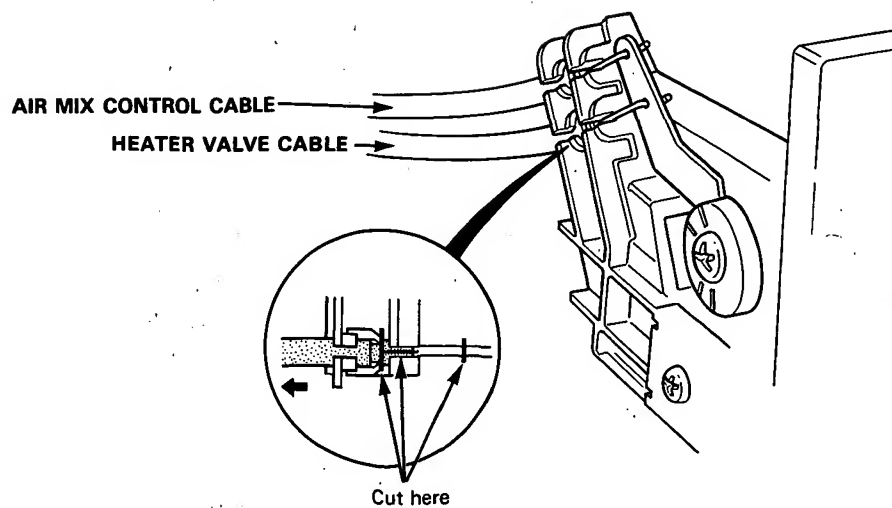
6. Install in the reverse order of removal, reconnect the cables, making sure they are properly adjusted (see page 21-16).



## Overhaul



1. Cut and remove the cable.
2. Install the new cable.

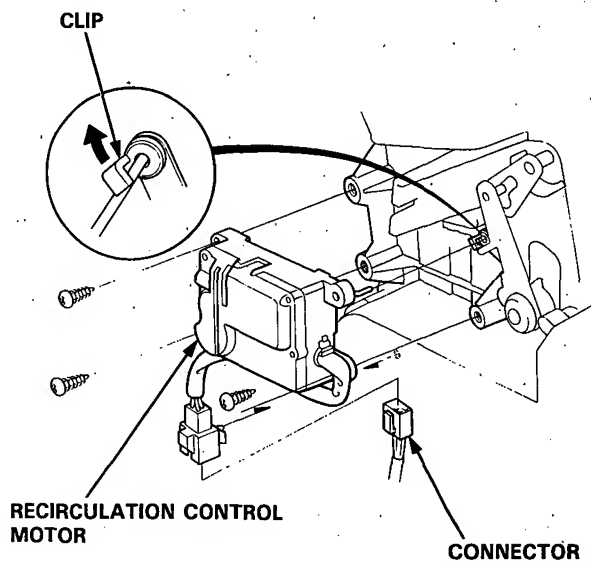


NOTE: After assembly check that the temperature control knob smoothly the full rotation.

# Recirculation Control Motor

## Replacement

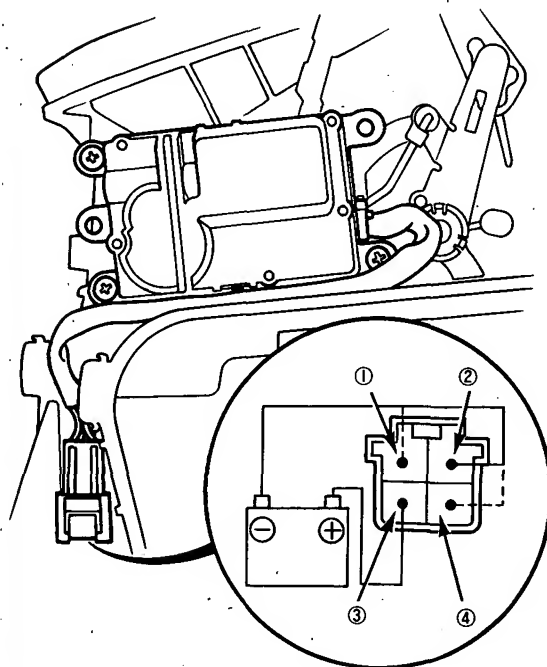
1. Disconnect the connector from the recirculation control motor.
2. Remove the three screws and recirculation control motor.



3. Install in the reverse order of removal. After installation, make sure the recirculation control motor operates smoothly.

## Test

1. Disconnect the recirculation control motor connector. Connect battery power to the ③ terminal of the motor connector and ground the ② terminal.
  2. Using a jumper wire, connect the ② terminal and ① or ④ terminal.
    - With the door in REC position, the motor should turn with the ② terminal connected to ① terminal.
    - With the door in FRESH position, the motor should turn with the ② terminal connected to ④ terminal.
- The motor will automatically stop after half a turn.



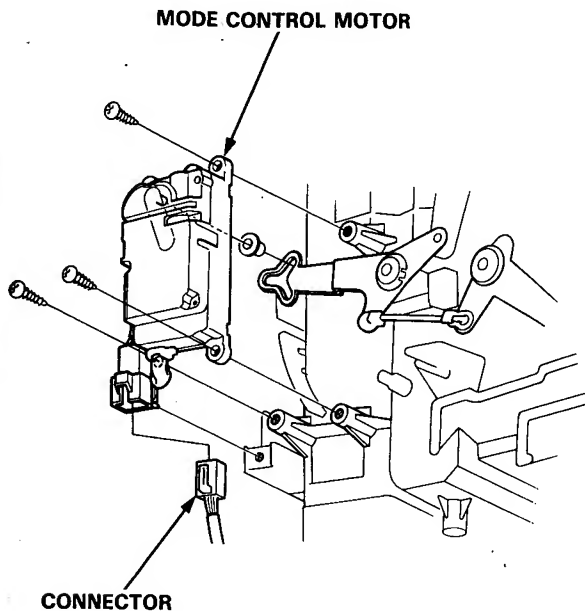
View from terminal side

3. If the recirculation control motor does not run in step 1, remove it, and check the recirculation control links and doors for smooth movement. If the recirculation control links and doors move smoothly, replace the recirculation control motor.

# Mode Control Motor

## Replacement

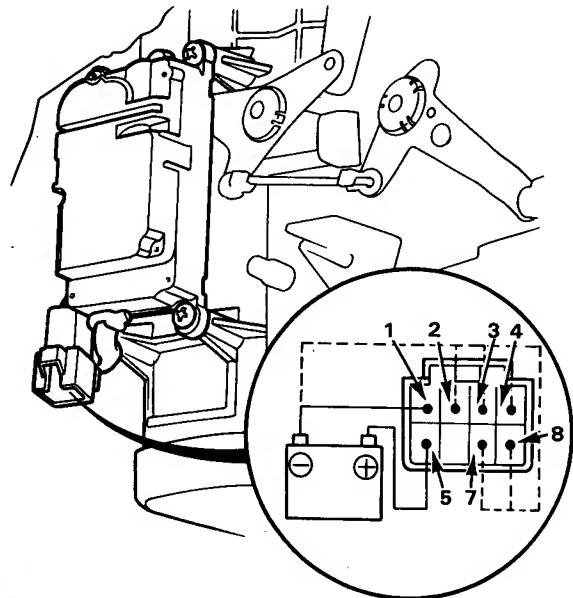
1. Disconnect the connector from the mode control motor.
2. Remove the three screws and mode control motor.



3. Install in the reverse order of removal. After installation, make sure the mode control motor operates smoothly.

## Test

1. Connect battery power to the 5 terminal of the mode control motor and ground the 1 terminal.
2. Using a jumper wire, connect the 1 terminal individually to the 2, 3, 4, 7 and 8 terminals in that order. The motor should run each time.



View from terminal side

3. If the mode control motor does not run in step 2, remove it, and check the mode control links and doors for smooth movement. If the mode control links and doors move smoothly, replace the mode control motor.





## Air Conditioning

Special Tools .....	22-2	A/C System Service	
Illustrated Index .....	22-3	Recovery .....	22-24
Circuit Diagram .....	22-4	Evaporator	
Wire Harness Routing .....	22-6	Replacement .....	22-25
Troubleshooting .....	22-7	Overhaul .....	22-27
Flowcharts		Condenser	
A/C System .....	22-8	Replacement .....	22-28
Compressor .....	22-12	Compressor (Nippondenso)	
Condenser Fan .....	22-15	Description .....	22-29
Radiator Fan .....	22-16	Illustrated Index .....	22-30
Radiator Fan Control Module		Replacement .....	22-31
Input Test .....	22-17	Clutch Inspection .....	22-33
A/C Thermostat		Clutch Overhaul .....	22-34
Test .....	22-18	Relief valve Replacement .....	22-35
Relay		Belt Tension .....	22-36
Test .....	22-18	A/C System Service	
A/C Switch/Heater Fan Switch		Evacuation .....	22-37
Test .....	22-19	Leak test .....	22-38
Diode		Charging .....	22-39
Test .....	22-19		
Service Tips and Precautions .....	22-20		
A/C Torque Specifications .....	22-21		
A/C System Service			
Performance Test .....	22-22		
Pressure Test .....	22-23		

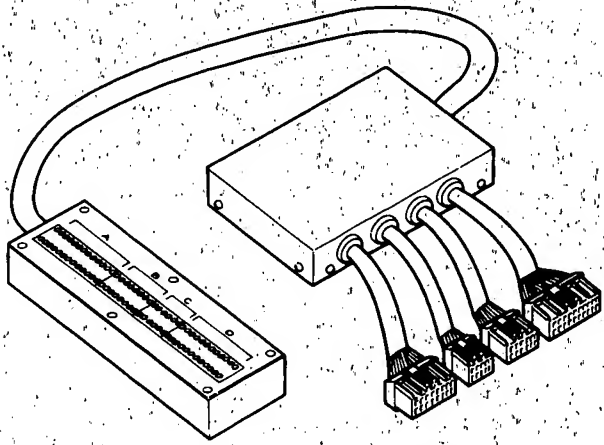
### CAUTION:

- The A/C system of this model uses R-12 refrigerant. Do not use R-134a refrigerant.
- Use only a R-12 refrigerant Recovery/Recycling System and Air Conditioning Service Station.
- Use only R-12 refrigerant oil.
- Use only R-12 refrigerant O-rings.




# Special Tools

Special Tool				
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07LAJ-PT3010A	Test Harness	1	22-13
②	07JGG-001010A	Belt Tension Gauge	1	23-36



①



②

# Illustrated Index



## EVAPORATOR

As refrigerant circulates, heat is absorbed from the surrounding passenger compartment air.  
Replacement, page 22-25  
Overhaul, page 22-27

## SIGHT GLASS

## CONDENSER

Dissipates the heat which was absorbed by the refrigerant.  
Replacement, page 22-28

## A/C PRESSURE SWITCH

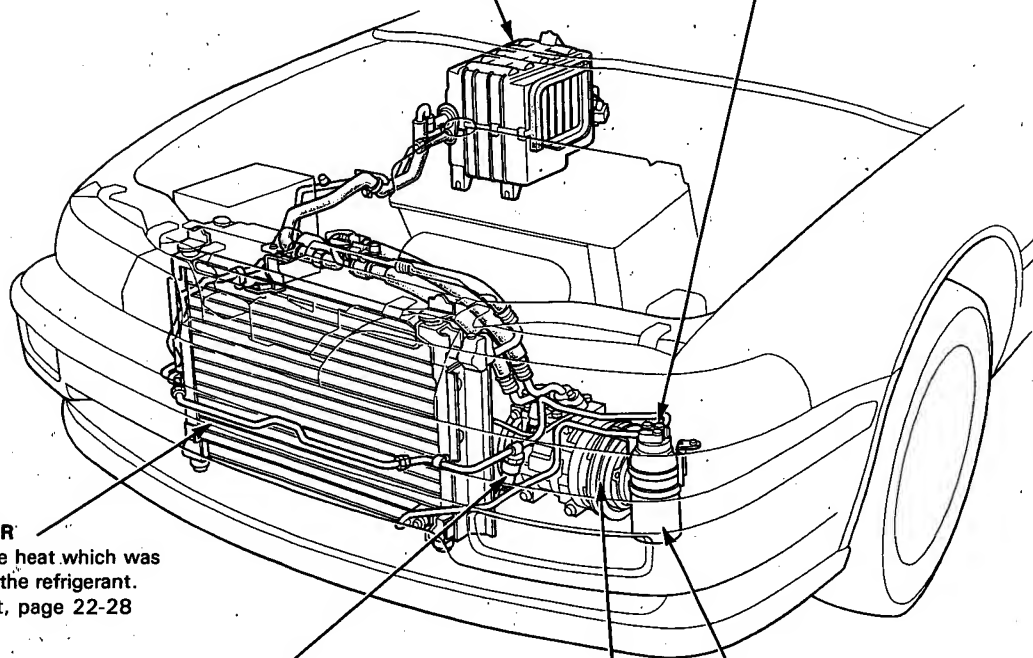
When the refrigerant pressure is below 215 kPa (33 psi) due to refrigerant leakage or above 2350 kPa (340 psi) due to coolant blockage the A/C pressure switch opens the circuit to the A/C control unit and stops the air conditioning to protect the compressor.

## RECEIVER/DRYER

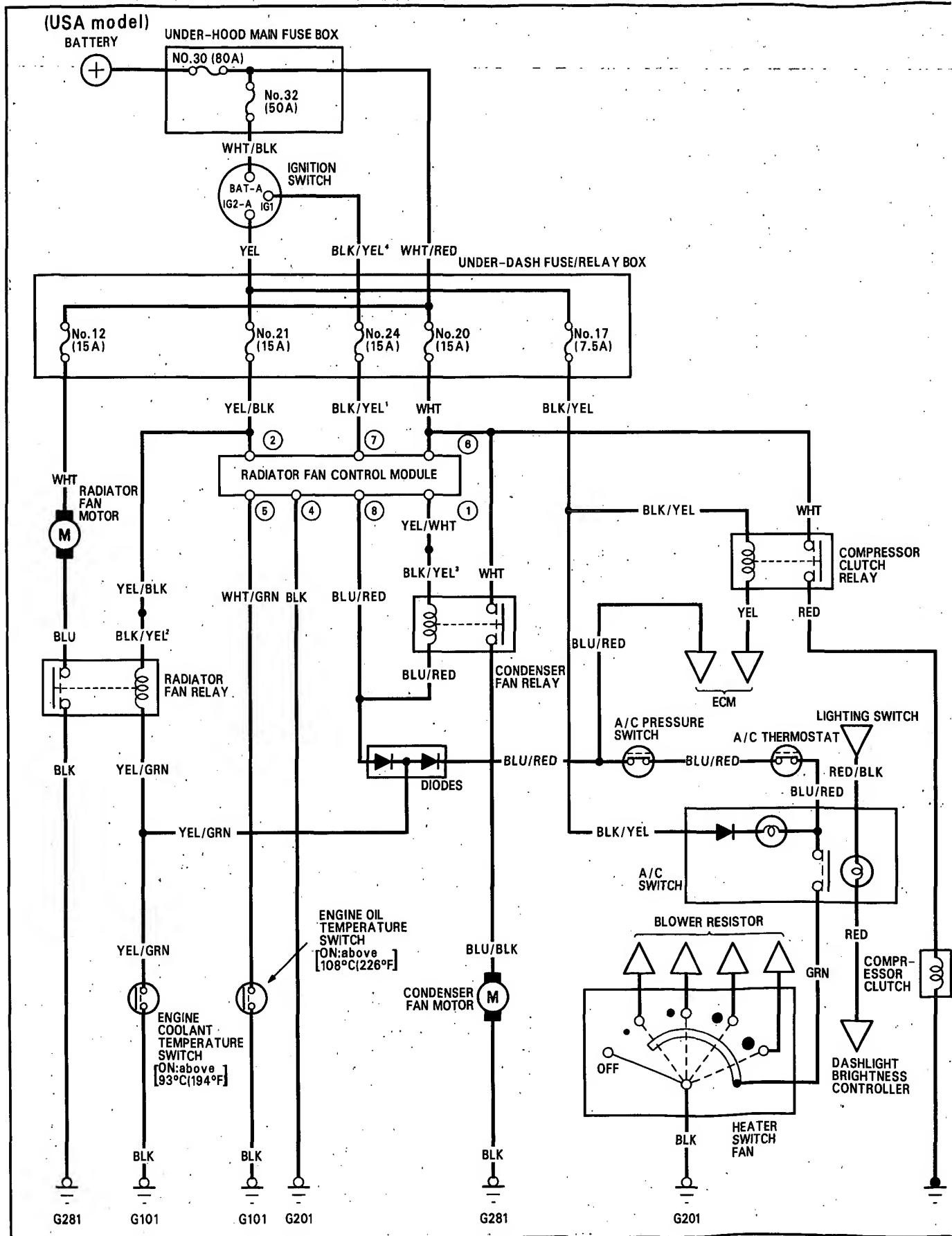
Serves as a reservoir which filters and removes moisture from the refrigerant.

## COMPRESSOR (NIPPONDENSO)

Compresses the refrigerant and then forces it through the condenser.  
Replacement, page 22-31

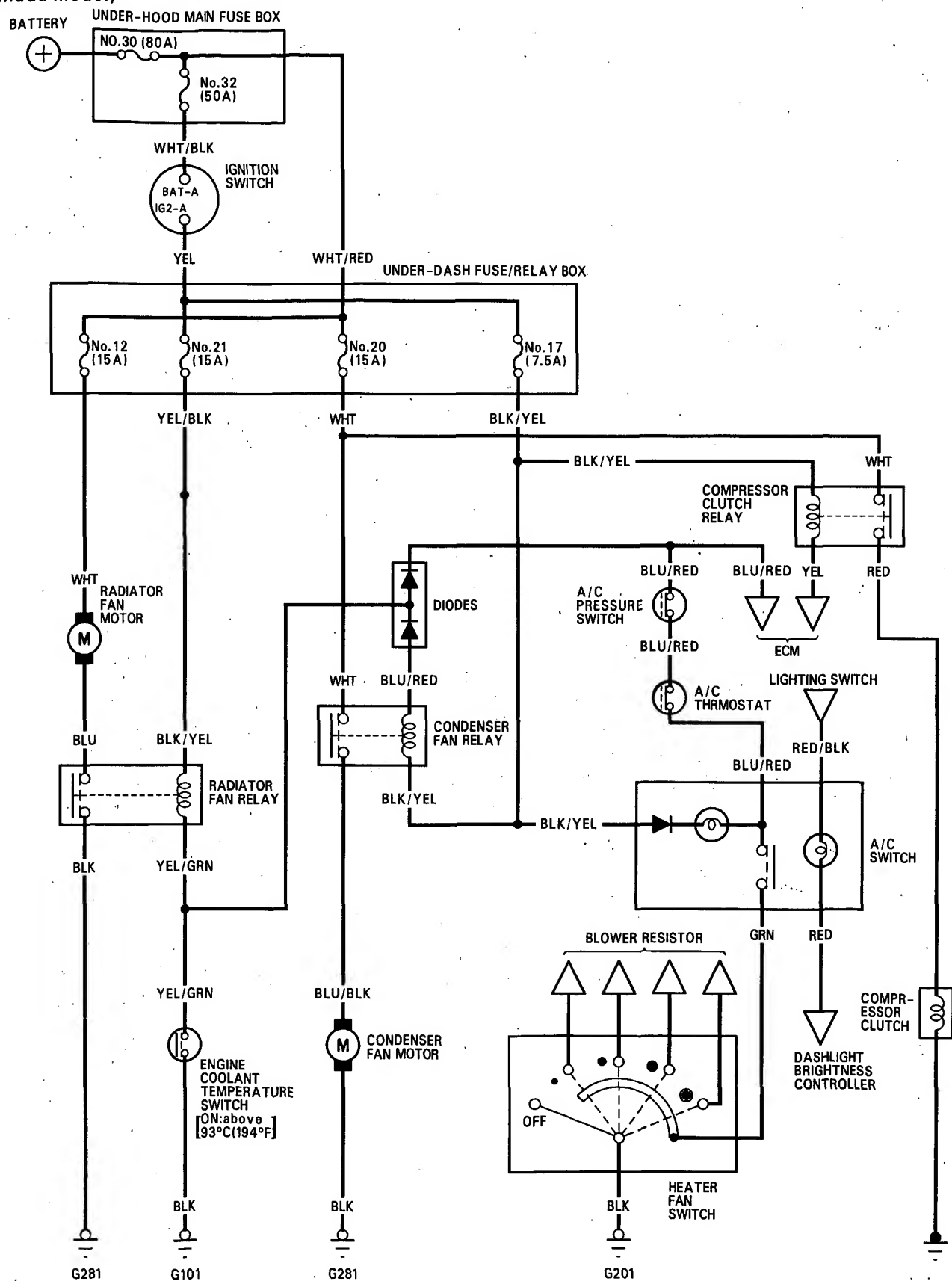


# Circuit Diagram

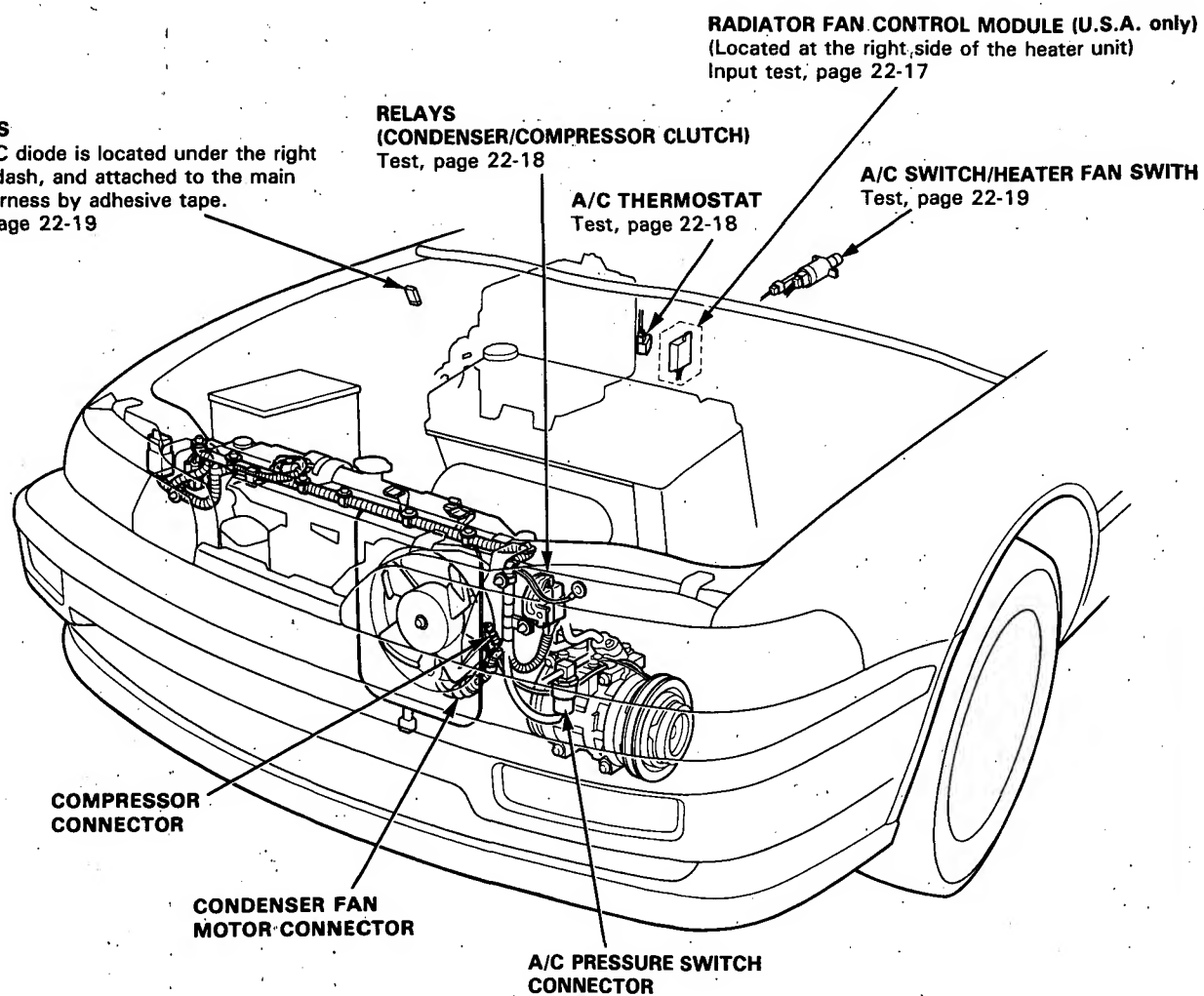




(Canada model)



# Wire Harness Routing



# Troubleshooting



## Reference Chart

### NOTE:

- Because of the precise measurements needed, use a multimeter when testing.
- Before performing any troubleshooting procedures, make sure all.
- All electrical connections are clean and tight; then check the following fuses and grounds:

Fuses No.	12, 17, 20, 21, 24
Grounds No.	G281, G101, G201

SYMPTOM	PAGE
A/C system does not come on. (Compressor and both fans).	see page 22-8
Compressor does not come on. (Both fans operate normally).	see page 22-12
Condenser fan does not operate at all.	see page 22-15
Radiator fan does not with A/C on	see page 22-16

# Troubleshooting

## Flowchart — A/C System

A/C system does not come on.  
(compressor and both fans).

NOTE: A/C compressor clutch will not engage without the engine running.

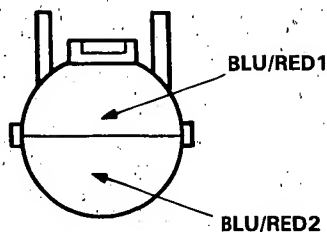
Turn the ignition switch OFF

Disconnect the 2P connector from  
the A/C pressure switch.

Turn the heater fan switch and  
A/C switch ON, and start the  
engine.

Connect a jumper wire between  
the BLU/RED1 wire terminal and  
body ground.

A/C PRESSURE SWITCH CON-  
NECTOR



View from terminal side

Do both fans and the compres-  
sor run?

NO

Repair open in the BLU/RED1 wire  
between the A/C pressure switch  
and diodes.

YES

Connect a jumper wire between  
the BLU/RED1 and 2 wire ter-  
minals.

Do both fans and the compres-  
sor run?

YES

Check refrigerant pressure (see  
page 22-22). If pressure is good,  
replace the A/C pressure switch.

NO

Turn the ignition switch OFF

(To page 22-9)





(From page 22-8)

Reconnect the 2P connector to the A/C pressure switch.

Disconnect the 2P connector from the A/C thermostat.

Connect a jumper wire between the BLU/RED2 wire terminal and body ground.

Start the engine.

Do both fans and the compressor run?

NO

Repair open in the BLU/RED2 wire between the A/C pressure switch and A/C thermostat.

YES

Connect a jumper wire between the BLU/RED2 and 3 wire terminals.

Do both fans and the compressor run?

YES

Check evaporator temperature. If temperature is above 41°F (5°C), replace A/C thermostat.

NO

Turn the ignition switch OFF.

Reconnect the 2P connector to the A/C thermostat.

Remove the heater control panel (see page 21-14 or 21-32)

(To page 22-10)

BLU/RED3

BLU/RED2



View from wire side

A/C THERMOSTAT CONNECTOR

# Troubleshooting

## Flowchart — A/C System (cont'd)

(From page 22-9)

Disconnect the 6P connector from the A/C switch

Connect a jumper wire between the BLU/RED3 wire terminal and body ground.

Start the engine.

Do both fans and the compressor run?

NO

Repair open in the BLU/RED3 wire between the A/C thermostat and A/C switch.

YES

Connect a jumper wire between the BLU/RED3 and GRN wire terminals.

Do both fans and the compressor run?

YES

Inspect the A/C switch. (see page 22-19)

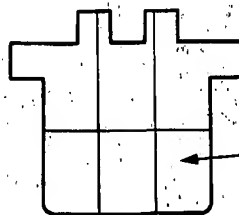
NO

Reconnect the 6P connector to the A/C switch, and turn the A/C switch ON.

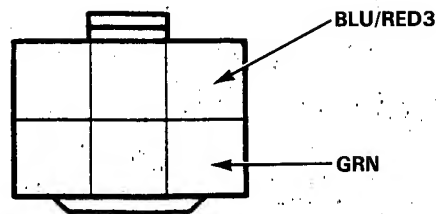
Disconnect the 6P connector from the heater fan switch.

Connect a jumper wire between the GRN wire terminal and body ground.

(To page 22-11)



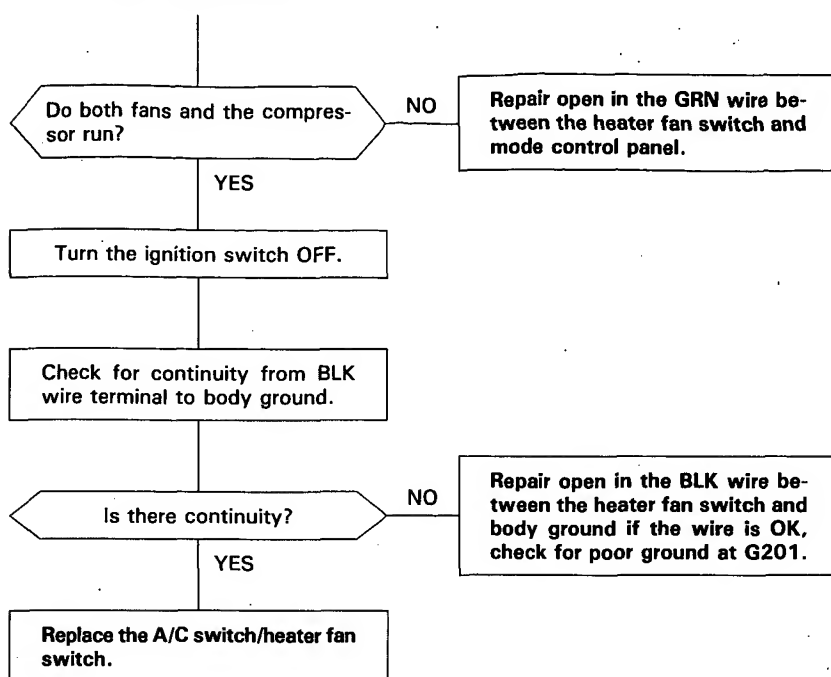
A/C SWITCH CONNECTOR  
View from wire side



HEATER FAN SWITCH CONNECTOR  
View from wire side



(From page 22-10)



# Troubleshooting

## Flowchart — Compressor

Compressor does not come on.  
(Both fans operate normally).

NOTE: A/C compressor clutch will not engage without the engine running.

Disconnect the A/C thermostat  
and start the engine. Connect a  
jumper wire between the  
BLU/RED wires.

Does the A/C compressor run?

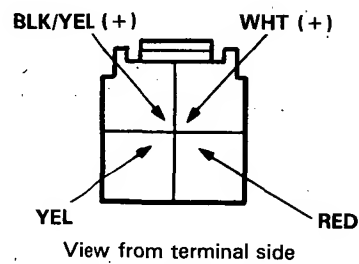
YES

Replace the A/C thermostat.

NO

Turn the ignition switch OFF.  
Disconnect the 4P connector from  
the compressor clutch relay.

Measure voltage between the  
WHT wire terminal (+) and body  
ground.



Is there battery voltage?

NO

Repair open in the WHT wire be-  
tween the under-dash fuse/relay  
box and compressor clutch relay.

YES

Turn the ignition switch ON.

Measure voltage between the  
BLK/YEL wire terminal (+) and  
body ground.

Is there battery voltage?

NO

Repair open in the BLK/YEL wire  
between the under-dash fuse/  
relay box and compressor clutch  
relay.

YES

Start the engine.

Connect a jumper wire between  
the WHT wire terminal and the  
RED wire terminal.

Does the compressor clutch  
engage?

NO

Turn the ignition switch OFF.

YES

(To page 22-13)

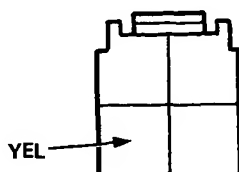
(To page 22-14)



(From page 22-12)

Turn the ignition switch OFF, and reconnect the 4P connector to the compressor clutch relay.

Restart the engine, and connect the jumper wire between the YEL wire terminal and body ground.



View from terminal side  
**COMPRESSOR CLUTCH RELAY  
CONNECTOR**

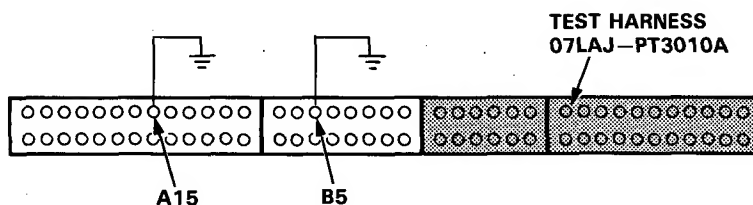
Does the compressor clutch engage?

NO

Replace the compressor clutch relay.

YES

Turn the ignition switch OFF, and disconnect the ECM connector, and connect the test harness (see section 11).



Restart the engine, and connect the jumper wire between A 15 terminal and body ground.

Does the compressor clutch engage?

NO

Repair open in the YEL wire between the compressor clutch relay and the ECM.

YES

Using the jumper wire, connect terminal B5 to body ground.

Does the compressor clutch engage?

YES

Repair open in the BLU/RED wire between the ECM and the A/C pressure switch.

NO

Substitute a known-good ECM and recheck. If prescribed voltage is now available, replace the original ECM.

(cont'd)

# Troubleshooting

## — Flowchart — Compressor (Cont'd)

(From page 22-12)

Disconnect the RED wire terminal from the A/C compressor clutch and, turn the ignition switch ON.

Measure voltage between the RED wire terminal (+) and body ground.

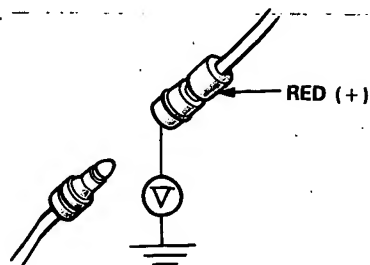
Is there battery voltage?

NO

Repair open in the RED wire between the compressor clutch relay and the compressor clutch connector.

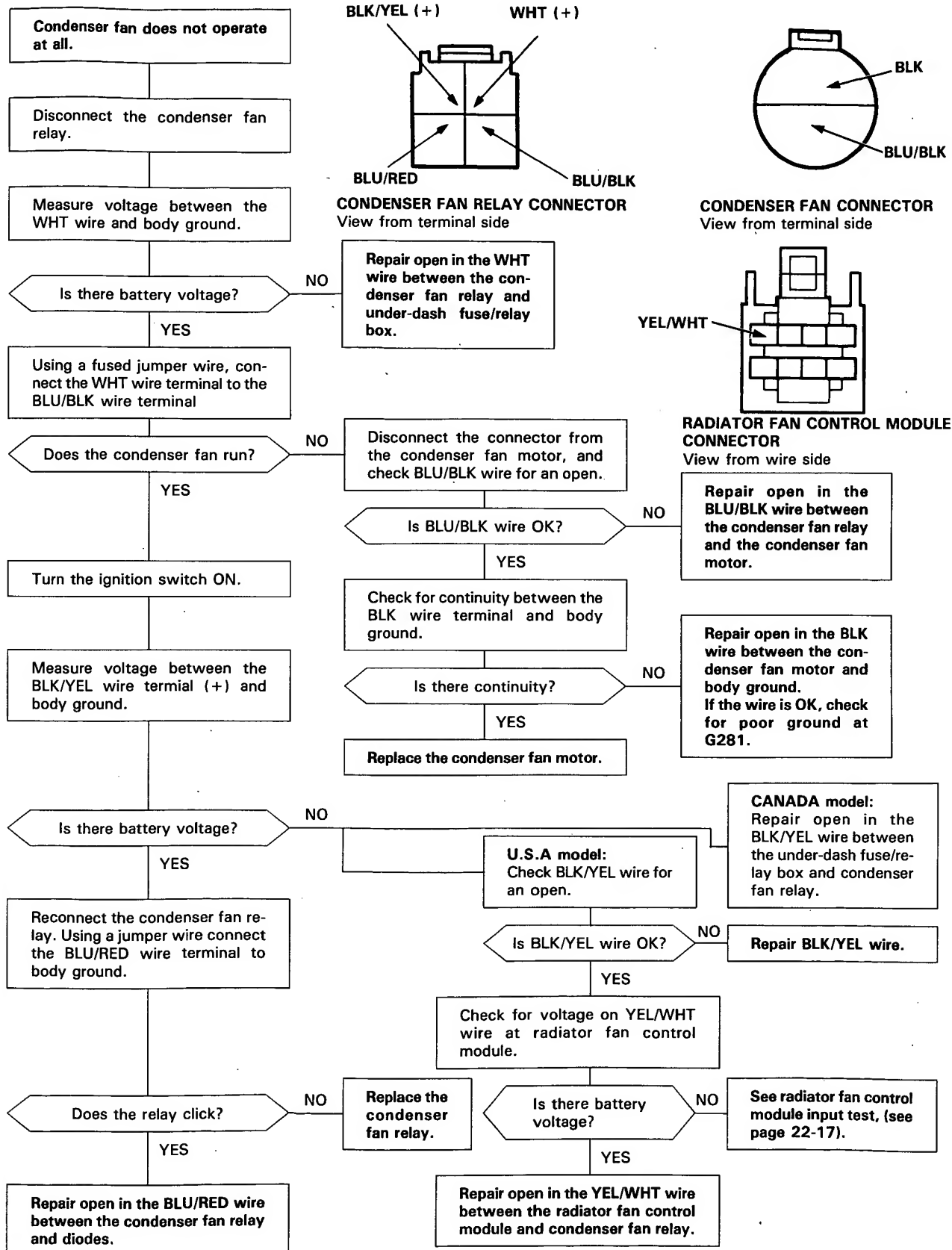
YES

Inspect the compressor clutch, (see page 22-33)



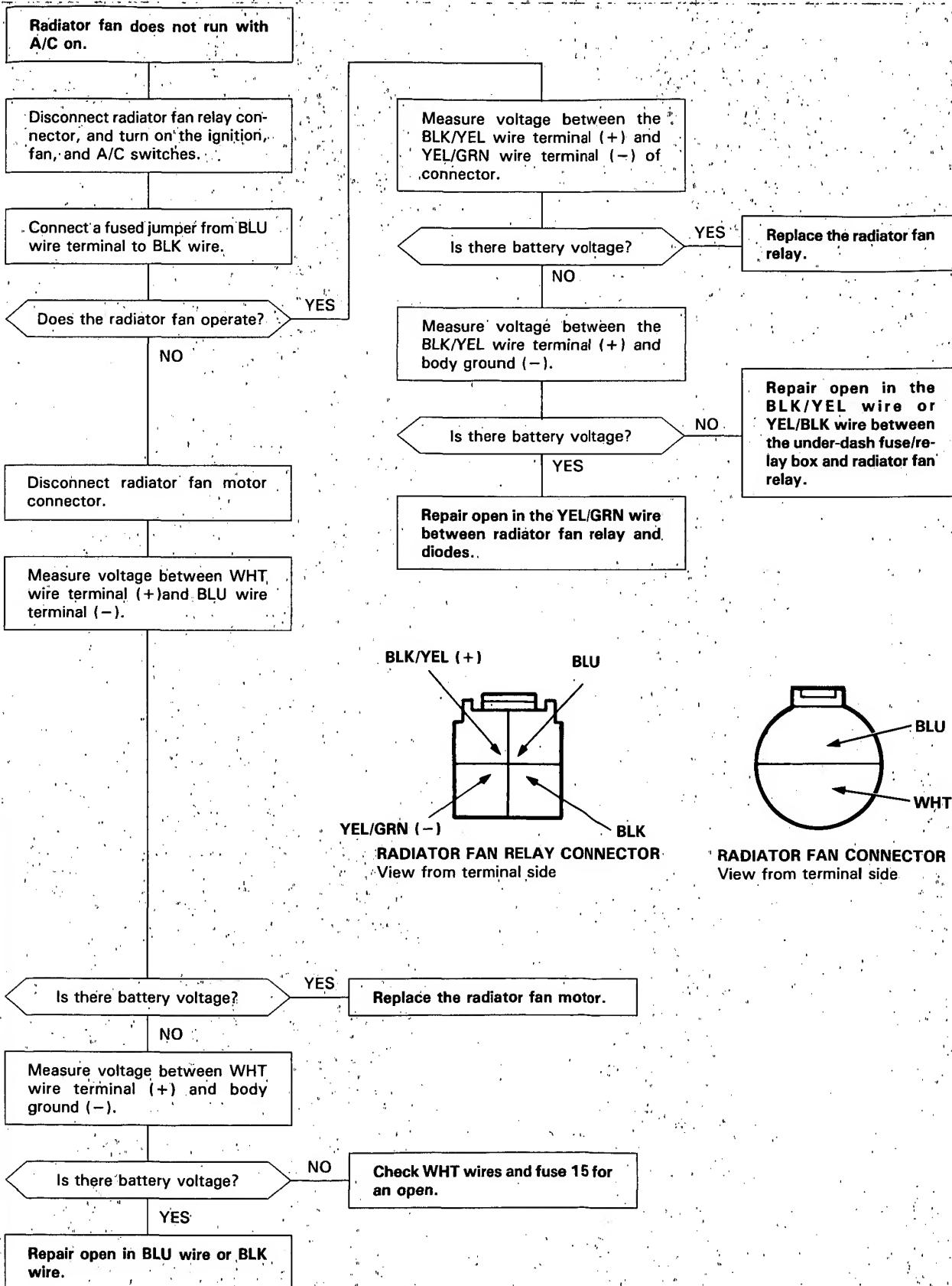


## Flowchart — Condenser Fan



# Troubleshooting

## Flowchart — Radiator Fan







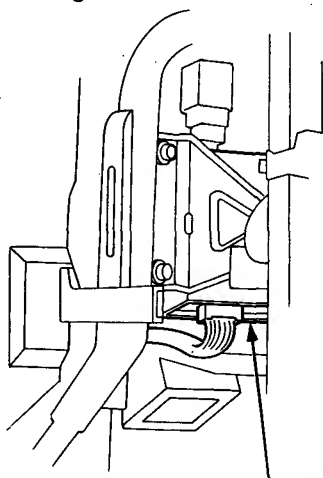
## Radiator Fan Control Module Input Tests (U.S.A. only)

### NOTE:

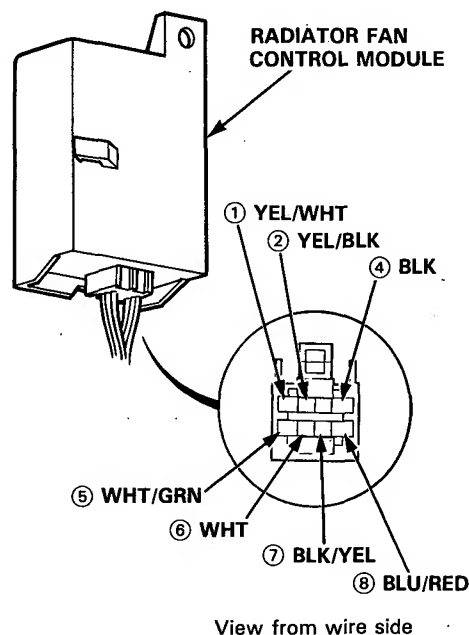
Perform the following tests with the radiator fan control module connected and the ignition switch ON and the A/C switch OFF.

If you find the cause of a problem, correct it before you continue.

- Located at the right side of the heater unit



RADIATOR FAN CONTROL MODULE



WIRE POSITION	TEST CONDITION	DESIRED RESULTS	CORRECTIVE ACTION IF DESIRED RESULTS ARE NOT OBTAINED
④ BLK	Check for voltage to body ground.	Should have less than 1 volt.	Repair open to body ground.
⑥ WHT	Check for battery voltage.	Should have battery voltage.	Check No. 20 fuse; if OK, repair open in WHT wire.
⑦ BLK/YEL	Check for battery voltage (Ignition switch—ON)		Check No. 24 fuse; if OK, repair open in BLK/YEL wire.
② YEL/BLK	Check for battery voltage (Ignition switch—ON)		Check No. 21 fuse; if OK, repair open in YEL/BLK wire.
① YEL/WHT	Check for battery voltage. (Ignition switch—ON)		Replace radiator fan control module. Before you connect the new radiator fan control module, check continuity between the YEL/WHT wire and ground, using the 20k scale on your ohmmeter. There should be no continuity. If there is continuity, the new radiator fan control module will be damaged when you connect it.
⑧ BLU/RED	Connect to body ground. (Ignition switch—ON)	Condenser fan should come on.	Check for open in the BLU/RED wire between radiator fan control module and condenser fan relay. If OK, check for open YEL/WHT and BLK/YEL <sup>3</sup> wires. If OK, test condenser fan relay
⑤ WHT/GRN	Check for voltage.	Approx 11V (Engine oil temperature below 108°C)	Faulty engine oil temperature switch, short to body ground, or faulty radiator fan control module.

## A/C Thermostat

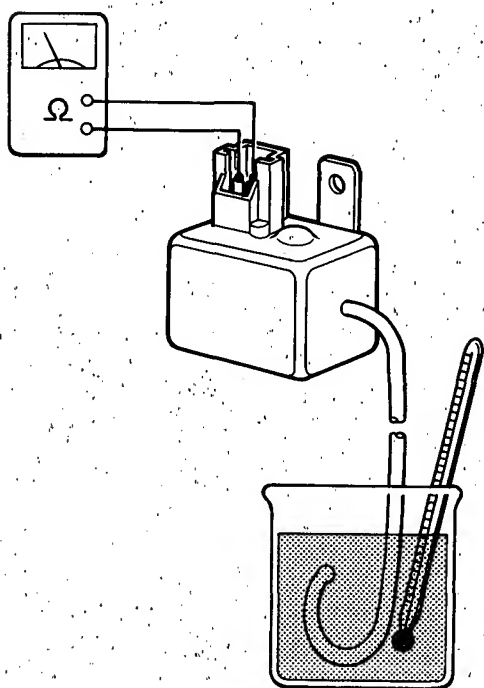
### Test

Dip the A/C thermostat into a cup filled with ice water, and check for continuity between the terminals.

Cut off 35–25°F (1.5––0.5°C)

Cut in 36–41°F (2.5–5°C)

If cut off or cut in temperature is too low, or too high, replace the A/C thermostat.

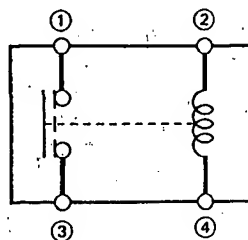
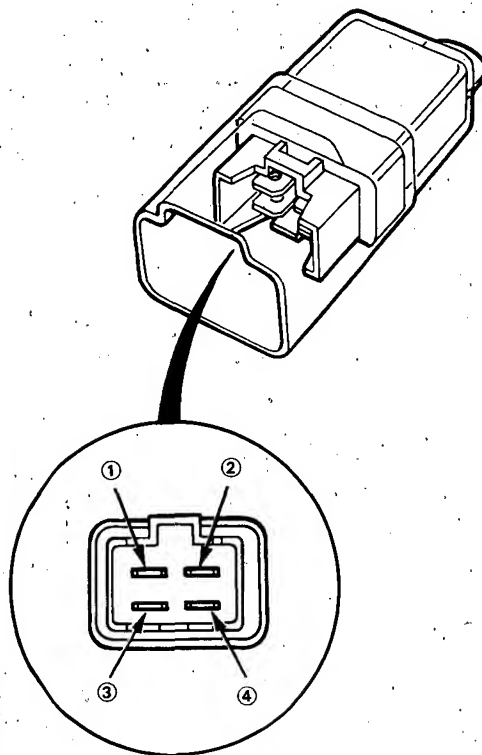


## Relay

### Test

NOTE: All A/C system relays are similar.

1. Using an ohmmeter, check for continuity between terminals ② and ④. There should be continuity.
2. Connect a 12 V battery across terminals ② and ④. Using an ohmmeter, check for continuity between terminals ① and ③. There should be continuity.



3. If continuity is not correct, replace the relay.

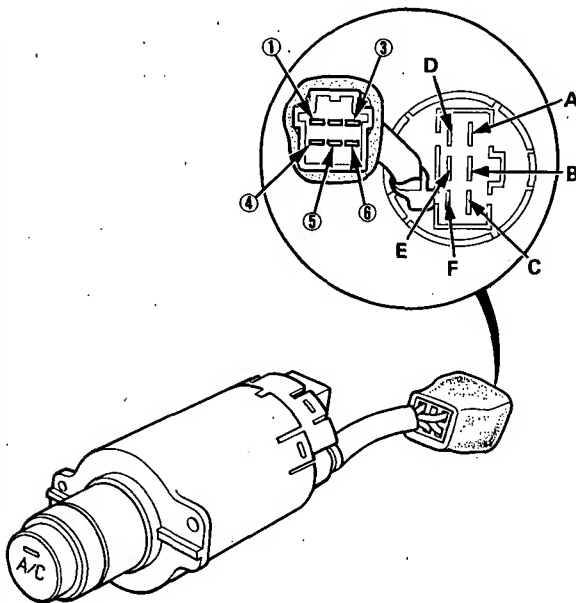
# A/C Switch/Heater Fan Switch

## Test

1. Check for continuity between the terminals according to the table.

### A/C SWITCH

Terminal No. Position	①	④	③	⑥	⑤
OFF	○—○		○—○	⬅—○	○
ON	○—○		○—○	○—○	⬅—○



### HEATER FAN SWITCH

Terminal Position	A	B	C	D	E	F
OFF						
•			○—○		○—○	○—○
•		○—○			○—○	○—○
•	○—○				○—○	○—○
•				○—○	○—○	○—○

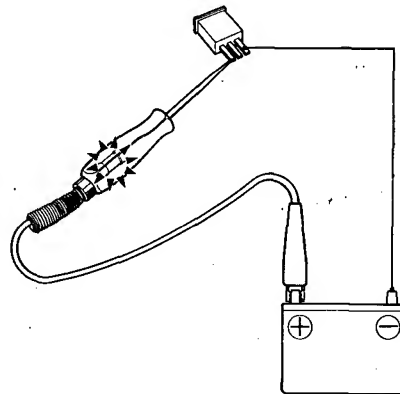
2. If continuity is not correct, replace the A/C switch/heater fan switch.

# Diode

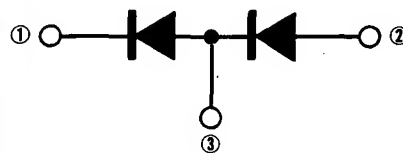
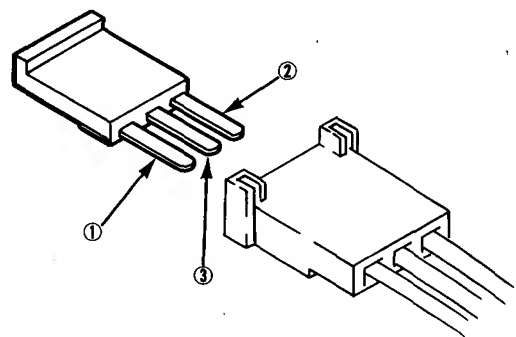
## Test

**NOTE:** The diodes are designed to pass current in one direction and block current in the opposite direction. Most ohmmeters, unless equipped with a diode tester, should not be used to test diodes.

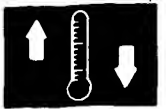
- The diode is located under the right side of the dash, and attached to the main wire harness by adhesive tape.
1. Use a proper ohmmeter or continuity tester.
  - Or connect a test light lead to battery power and a jumper lead to body ground. The test light will come on when the diode passes current.



- Check for continuity in both directions between ① and ② terminals, ① and ③ terminals, and ③ and ② terminals. There should be continuity in only one direction.



2. If continuity is not correct, replace the diode.



# Service Tips and Precautions

## **⚠ WARNING** When handling refrigerant (R-12):

- Always wear eye protection.
- Do not let refrigerant get on your skin or in your eyes; if it does:
  - Do not rub your eyes or skin.
  - Splash large quantities of cool water in your eyes or on your skin.
  - Rush to a physician or hospital for immediate treatment. Do not attempt to treat it yourself.
- Keep refrigerant containers stored below 104°F (40°C).
- Do not handle or discharge refrigerant in an enclosed area near an open flame; it may ignite and produce a poisonous gas.
- The ozone is a fragile layer surrounding the earth which acts as a shield against the sun's ultraviolet radiation. Chlorine from chemicals called chlorofluorocarbons (CFCs) destroy the ozone in the stratosphere. Automotive air conditioning systems currently use chlorofluorocarbons as the refrigerant. Auto air conditioning service equipment has been developed to minimize the release of CFCs to the atmosphere. All service procedures should be performed using this equipment according to the manufacturer's instructions.

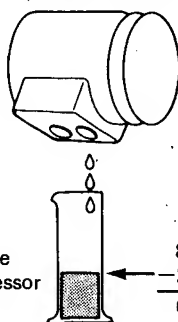
## **CAUTION:**

1. Always disconnect the negative cable from the battery whenever replacing air conditioner parts.
2. Keep moisture and dirt out of the system. When disconnecting any lines, plug or cap the fittings immediately; don't remove the caps or plugs until just before you reconnect each line.
3. Before connecting any hose or line, apply a few drops of refrigerant oil to the O-ring.
4. When tightening or loosening a fitting, use a second wrench to support the matching fitting.
5. When discharging the system, use a refrigerant recovery/recycling system; don't release refrigerant into the atmosphere.
6. Add refrigerant oil (NDOIL6) after replacing the following parts;
 

Condenser .....	10 cc (1/3 fl oz)
Evaporator .....	30 cc (1 fl oz)
Line or hose .....	10 cc (1/3 fl oz)
Receiver .....	10 cc (1/3 fl oz)
Compressor .....	On compressor replacement, subtract the volume of oil drained from the removed compressor from 80 cc (2 2/3 fl oz), and drain the calculated volume of oil from the new compressor:
	From 80 cc (2 2/3 fl oz) subtract the volume of oil you drained from the removed compressor = the volume to drain from the new compressor.

Example:

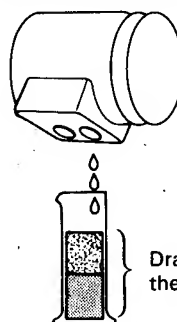
OLD COMPRESSOR



Oil from the  
old compressor

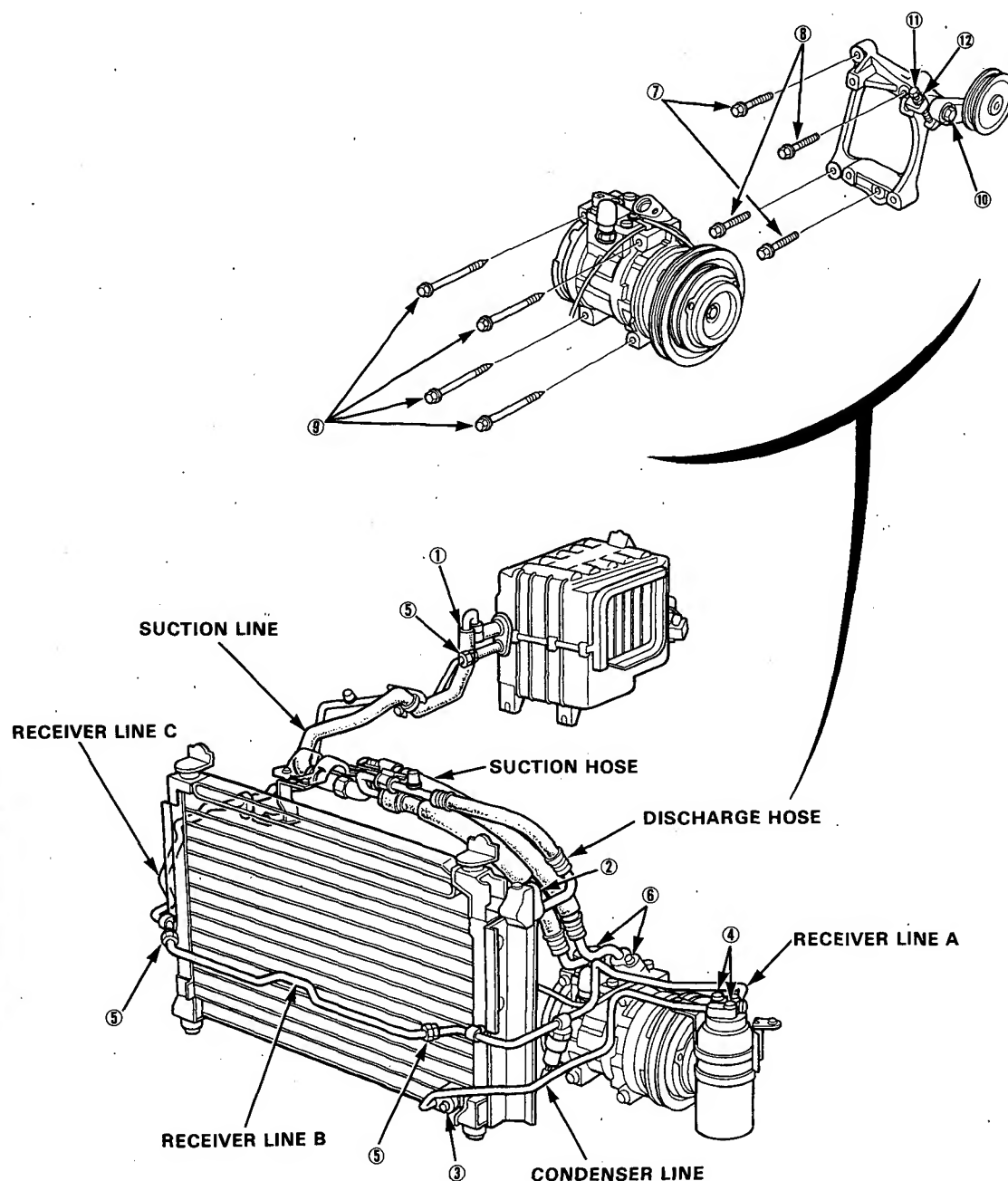
80 cc (2 2/3 fl oz)  
- 20 cc (2/3 fl oz)  
60 cc (2 fl oz)

NEW COMPRESSOR



Drain 60 cc (2 fl oz) from  
the new one.

# A/C Torque Specifications



① Suction line (evaporator side) .....	32 N·m (3.2 kg-m, 23 lb-ft)
② Discharge hose to condenser .....	22 N·m (2.2 kg-m, 16 lb-ft)
③ Condenser line to condenser .....	22 N·m (2.2 kg-m, 16 lb-ft)
④ Receiver tank .....	17 N·m (1.7 kg-m, 12 lb-ft)
⑤ Receiver line A, B, C (both side) .....	17 N·m (1.7 kg-m, 12 lb-ft)
⑥ Compressor hose mounting bolts .....	30 N·m (3.0 kg-m, 22 lb-ft)
⑦ Compressor bracket mounting bolts (10×45) .....	48 N·m (4.8 kg-m, 35 lb-ft)
⑧ Compressor bracket mounting bolts (10×55) .....	48 N·m (4.8 kg-m, 35 lb-ft)
⑨ Compressor mounting bolts (8×90) .....	25 N·m (2.5 kg-m, 18 lb-ft)
⑩ Idler pulley bracket bolts (10 x 30) .....	48 N·m (4.8 kg-m, 35 lb-ft)
⑪ Adjusting bolt (8×63)	
⑫ Locknut (8)	

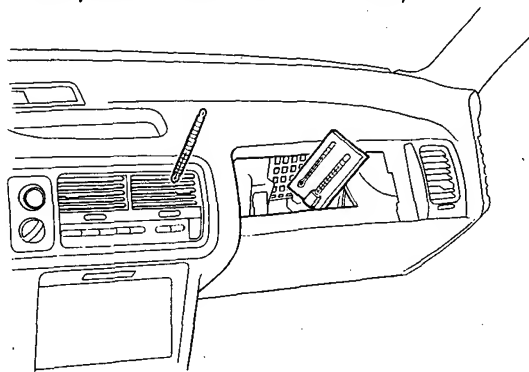
# Performance Test

The performance test will help determine if the air conditioning system is operating within specifications.

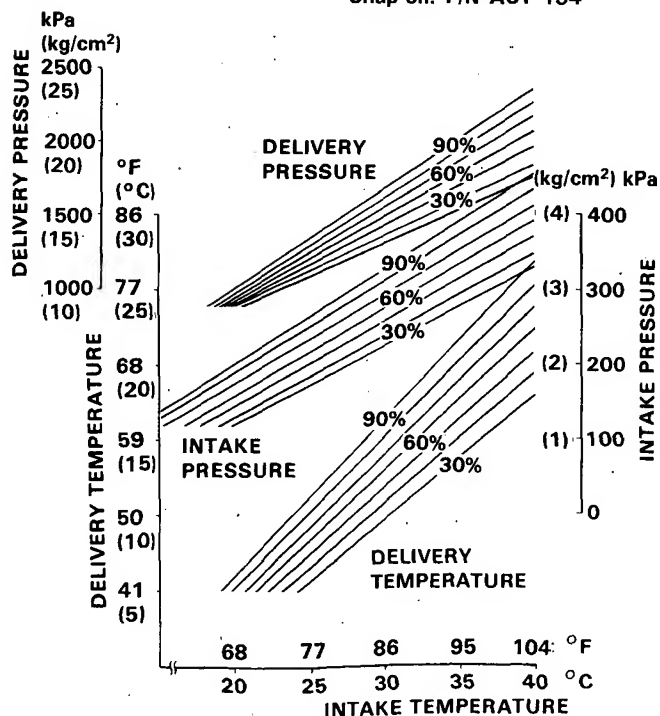
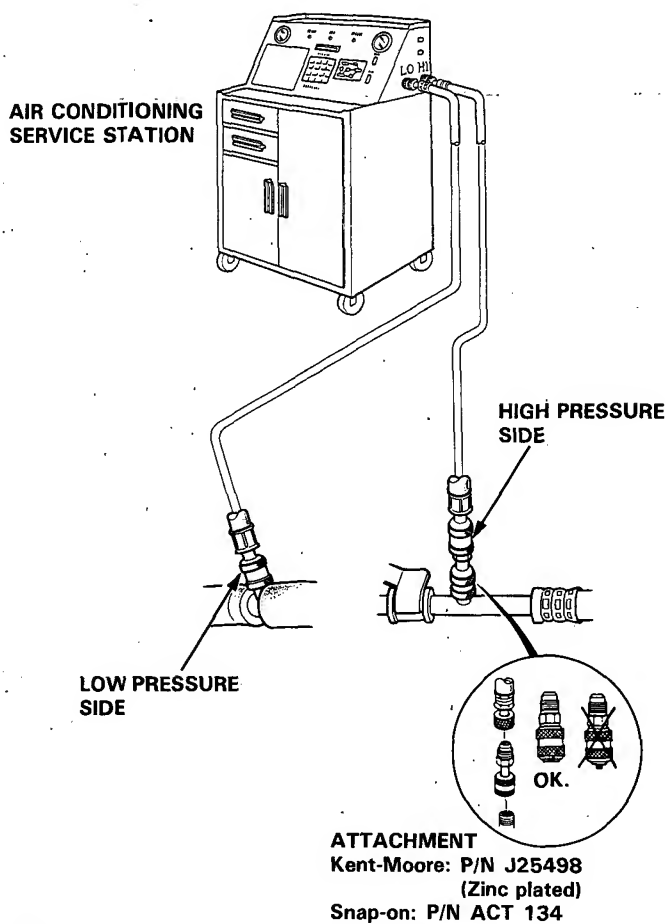
1. Connect the Air Conditioning Service Station as shown.

**NOTE:** Connect the adapter to the high-pressure hose first, then connect the hoses to the car as shown. When testing is completed, disconnect the hose adapter from the high-side fitting; do not disconnect the hose from the adapter, or refrigerant may escape from the system.

2. Insert a thermometer in the center vent outlet. Determine the relative humidity and ambient air temperature by information line, calling the local weather.
3. Test conditions:
  - Avoid direct sunlight.
  - Open engine hood.
  - Open front doors.
  - Set the temperature control knob to COOL, slide the mode control lever to VENT position, and recirculation control lever to REC. position.
  - Turn the heater fan switch to the highest position.
  - Run the engine at 1,500 RPM.
  - Nobody in the car.
4. After running the air conditioning for 10 minutes under the above test conditions, read the delivery temperature from the thermometer in the dash vent and the high and low system pressure from the Air Conditioning Service Station.
5. To complete the charts:
  - Mark the delivery temperature along the vertical line.
  - Mark the intake air temperature (air temperature) along the bottom line.
  - Draw a line straight up from the air temperature to the humidity.
  - Mark a point one line above and one line below the humidity level. (10% above and 10% below the humidity level)
  - From each point, draw a horizontal line across to the delivery temperature.
  - The actual delivery temperature should fall between the two lines.
  - Complete the low-side pressure test and high-side pressure test in the same way.



**CAUTION:** Use only a R-12 refrigerant Air Conditioning Service Station.



# Pressure Test



NOTE: Performance Test on page 22-22.

TEST RESULTS	RELATED SYMPTOMS	PROBABLE CAUSE	REMEDY
Discharge (high) pressure abnormally high	After stopping compressor, pressure drops to about 196 kPa (2.0 kg/cm <sup>2</sup> 28 psi) quickly, and then falls gradually	Air in system	Evacuate system; then recharge Evacuation: see page 22-37 Recharging: see page 22-39
	No bubbles in sight glass when condenser is cooled by water	Excessive refrigerant in system	Recover and recharge the system
	Reduced or no air flow through condenser.	<ul style="list-style-type: none"> <li>· Clogged condenser or radiator fins</li> <li>· Condenser or radiator fan not working properly</li> </ul>	<ul style="list-style-type: none"> <li>· Clean</li> <li>· Check voltage and fan rpm</li> <li>· Check fan direction</li> </ul>
	Line to condenser is excessively hot	Restricted flow of refrigerant in system	Restriction in condenser
Discharge pressure abnormally low	Excessive bubbles in sight glass; condenser is not hot	Insufficient refrigerant in system	<ul style="list-style-type: none"> <li>· Check for leak</li> <li>· Charge system</li> </ul>
	High and low pressures are balanced soon after stopping compressor	<ul style="list-style-type: none"> <li>· Faulty compressor discharge or inlet valve</li> <li>· Faulty compressor seal</li> </ul>	Replace compressor comp.
	Outlet of expansion valve is not frosted, low pressure gauge indicates vacuum	<ul style="list-style-type: none"> <li>· Faulty expansion valve</li> <li>· Moisture in system</li> </ul>	Repair or Replace
Suction (low) pressure abnormally low	Excessive bubbles in sight glass; condenser is not hot	Insufficient refrigerant	Check for leaks. Charge as required.
	Expansion valve is not frosted and low pressure line is not cold. Low pressure gauge indicates vacuum.	<ul style="list-style-type: none"> <li>· Frozen expansion valve</li> <li>· Faulty expansion valve</li> </ul>	Replace expansion valve
	Discharge temperature is low and the air flow from vents is restricted	Frozen evaporator	Run the fan with compressor off then check the thermostat and capillary tube.
	Expansion valve is frosted	Clogged expansion valve	Clean or Replace
	Receiver-dryer is cool (should be warm during operation)	Clogged receiver-dryer	Replace
Suction pressure abnormally high	Low pressure hose and check joint are cooler than temperature around evaporator	<ul style="list-style-type: none"> <li>· Expansion valve open too long</li> <li>· Loose expansion valve</li> </ul>	Repair or Replace
	Suction pressure is lowered when condenser is cooled by water	Excessive refrigerant in system	Recover and recharge the system
	High and low pressure are equalized as soon as the compressor is stopped; gauge needles chatter.	<ul style="list-style-type: none"> <li>· Faulty gasket</li> <li>· Faulty high pressure valve</li> <li>· Foreign particle stuck in high pressure valve</li> </ul>	Replace compressor comp.
Suction and discharge pressures abnormally high	Reduced air flow through condenser	<ul style="list-style-type: none"> <li>· Clogged condenser and/or radiator fins</li> <li>· Condenser or radiator fan not working properly</li> </ul>	<ul style="list-style-type: none"> <li>· Clean condenser and/or radiator</li> <li>· Check voltage and fan rpm</li> </ul>
	No bubbles in sight glass when condenser is cooled by water	Excessive refrigerant in system	Recover and recharge the system
Suction and discharge pressures abnormally low	Low pressure hose and metal end areas are cooler than evaporator	Clogged or kinked low pressure hose parts	Repair or Replace
	Temperature around expansion valve is too low compared with that around receiver-dryer.	Clogged high pressure line	Repair or Replace
Refrigerant leaks	Compressor clutch is dirty	Compressor shaft seal leaking	Replace compressor comp.
	Compressor bolt(s) are dirty	Leaking around bolt(s)	Replace compressor comp.
	Compressor gasket is wet with oil	Gasket leaking	Replace compressor comp.
Compressor heat damage	Black soot inside compressor and hoses.	Restriction or leak in system.	Flush entire system, replace rubber lines or hoses.

# A/C System Service

## Recovery

### ⚠ WARNING

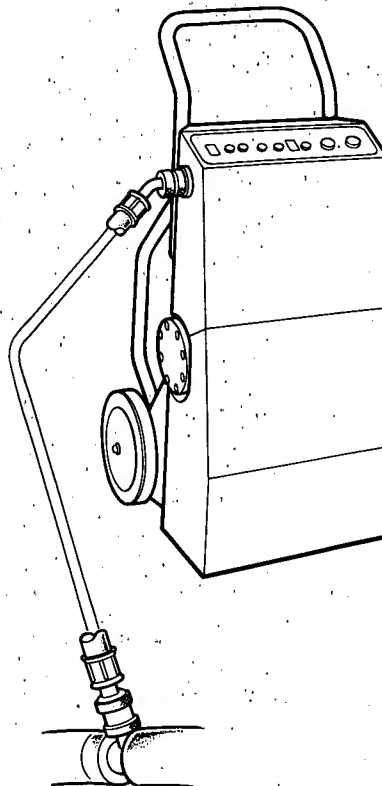
- Keep away from open flames. The refrigerant, although nonflammable, will produce a poisonous gas if burned.
  - Work in a well-ventilated area. Refrigerant evaporates quickly, and can force all the air out of a small enclosed area.
1. Connect the Refrigerant Recovery/Recycling System to the A/C system.
  2. Operate the Refrigerant Recovery/Recycling System according to the manufacture's instructions.

**IMPORTANT:** Do not vent refrigerant to the atmosphere. The chlorofluorocarbons (CFCs) used in conventional refrigerant (R-12) may damage the earth's ozone layer.

Always use UL-listed, refrigerant recovery/recycling equipment to extract the refrigerant before you open an A/C system to make repairs. Follow the equipment manufacture's instructions.

**CAUTION:** Use only a R-12 refrigerant Recovery/Recycling System.

**REFRIGERANT RECOVERY/  
RECYCLING SYSTEM**





# Evaporator

## Replacement

1. Disconnect the negative cable from the battery.

### NOTE:

The radio may have a coded theft protection circuit. Be sure to get the customer's code number before.

- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse (in the under-dash fuse/relay box).
- Removing the radio.

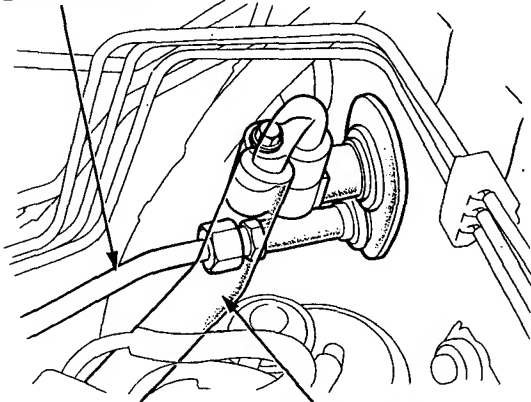
After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

2. Use the refrigerant recovery/recycling system to recover the refrigerant from the system (see page 22-24).

3. Disconnect the receiver line and the suction line from the evaporator.

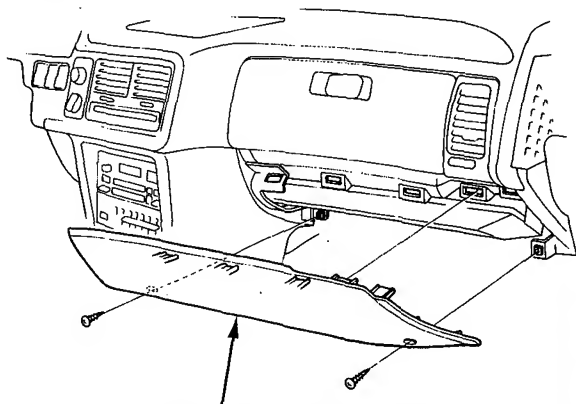
**CAUTION:** Cap the open fittings immediately to keep moisture out of the system.

RECEIVER LINE



SUCTION LINE

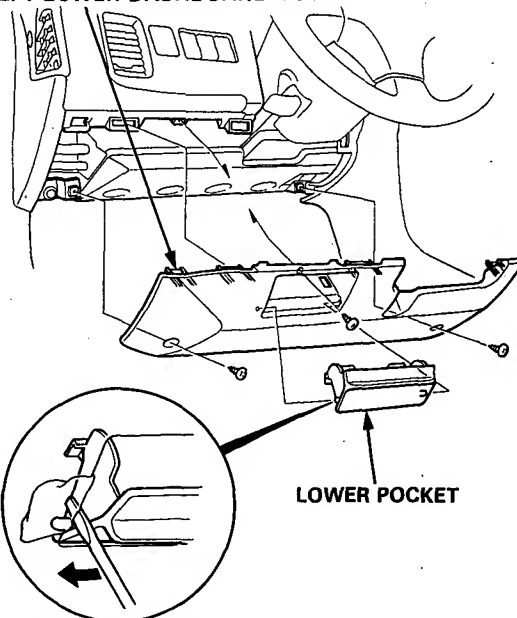
4. Remove the two screws and right lower dashboard cover.



RIGHT LOWER DASHBOARD COVER

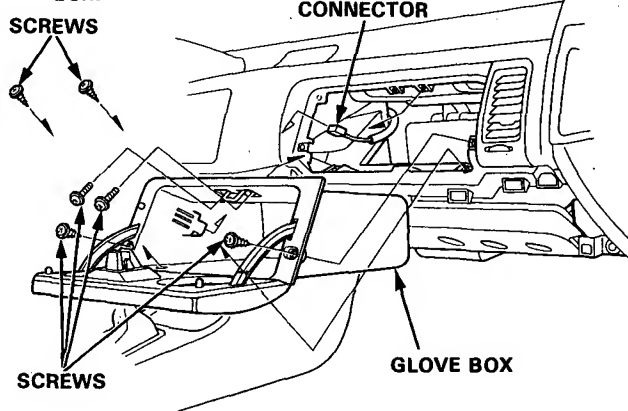
5. Remove the three screws and left lower dashboard cover.

LEFT LOWER DASHBOARD COVER



LOWER POCKET

6. Remove the six screws, one connector and glove box.



SCREWS

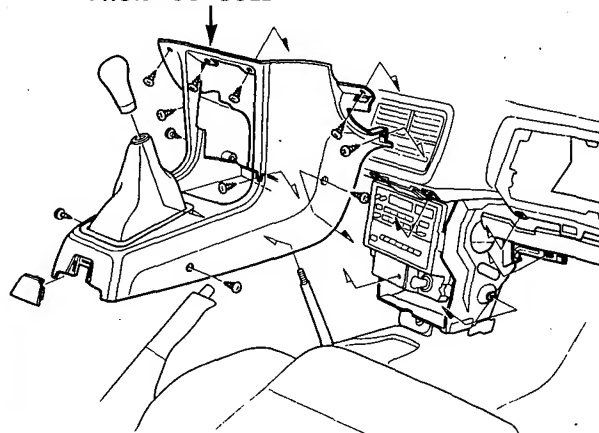
CONNECTOR

SCREWS

GLOVE BOX

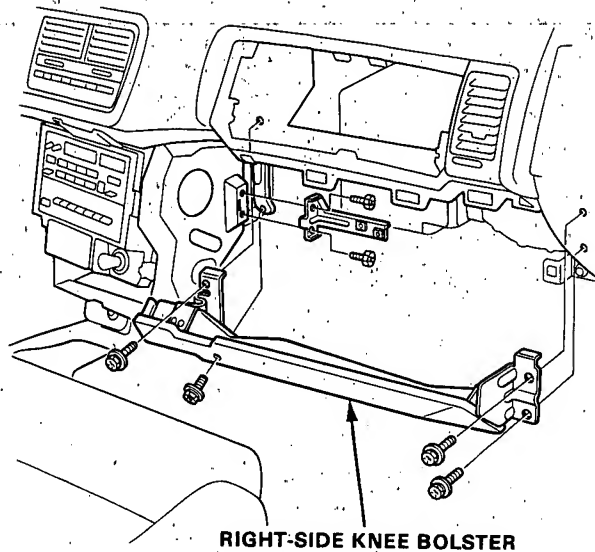
7. Remove the 11 screws and front console.

FRONT CONSOLE

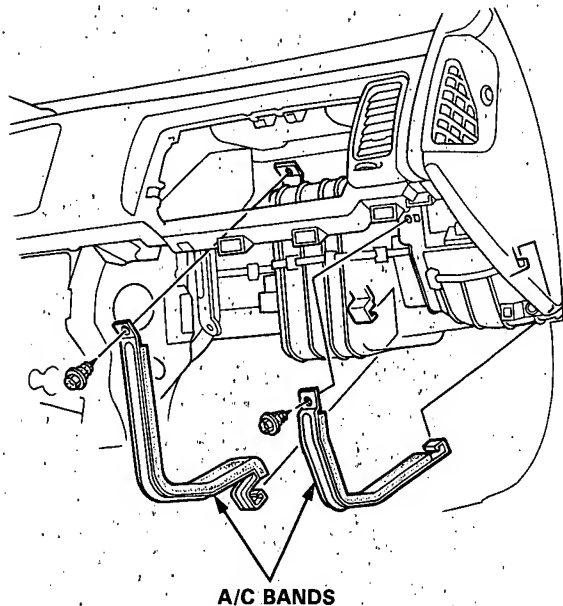


# Evaporator

8. Remove the right-side knee bolster.

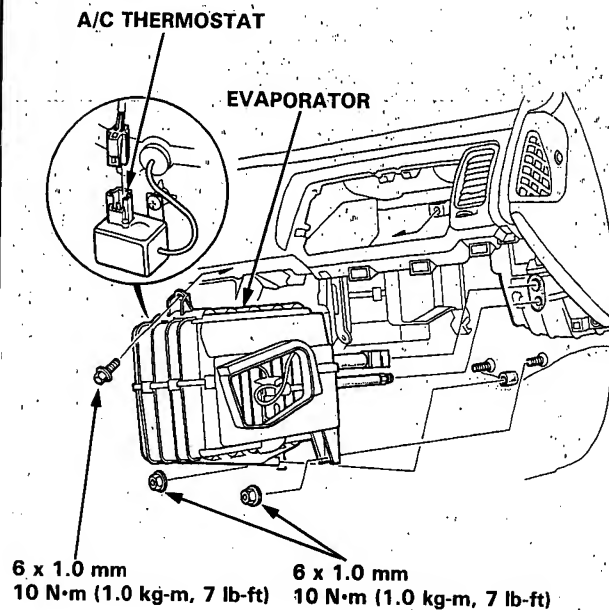


9. Remove the two self-tapping screws and A/C bands.



Disconnect the connector from the A/C thermostat, and pull off the wire harness from the clamps.

10. Remove the two nuts, one bolt and evaporator.



11. Install in the reverse order of removal, and:

- Replace all O-rings with new ones.
- Apply a sealant to the grommets.
- Make sure that there is no air leakage.
- Charge the system (see page 22-39), and test performance (see page 22-22).

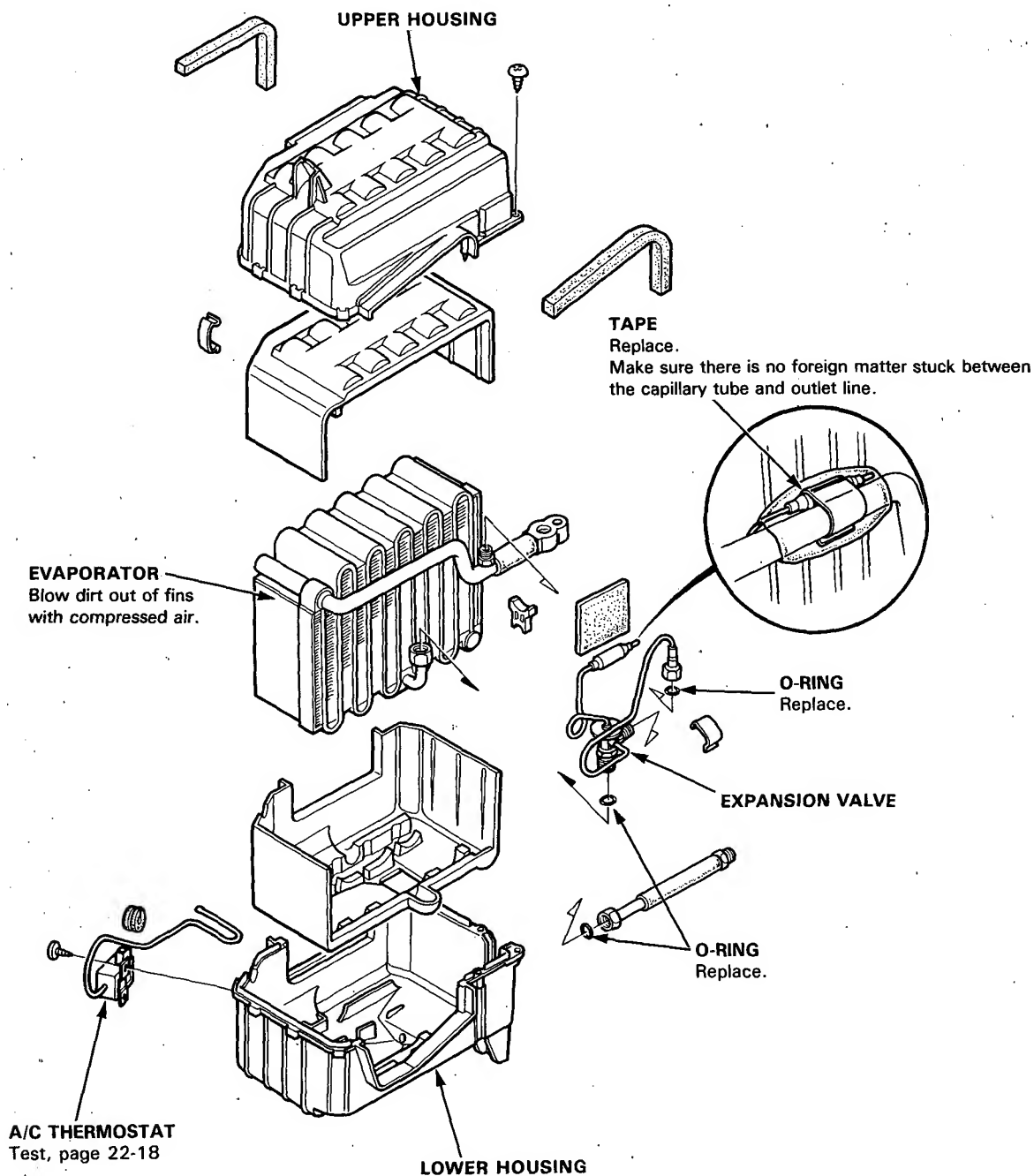


## Overhaul

1. Remove the A/C thermostat, and pull its sensor loop out of the evaporator fins.
2. Remove the self-tapping screws and clips from the housing.
3. Carefully separate the housings, and remove the evaporator covers.
4. Remove the expansion valve if necessary.

Assemble the evaporator in the reverse order of disassembly, and:

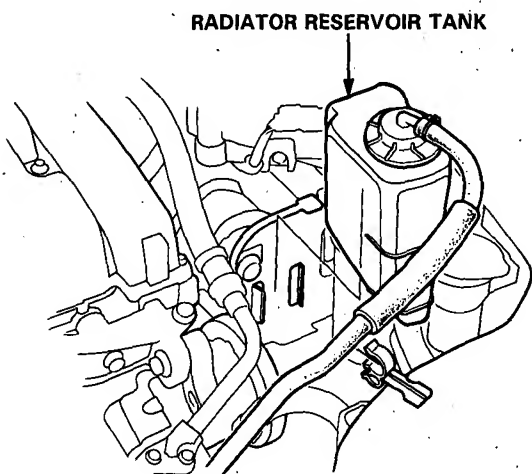
- Install the expansion valve capillary tube against the suction line, and wrap it with tape.
- Reinstall the A/C thermostat in its original location.



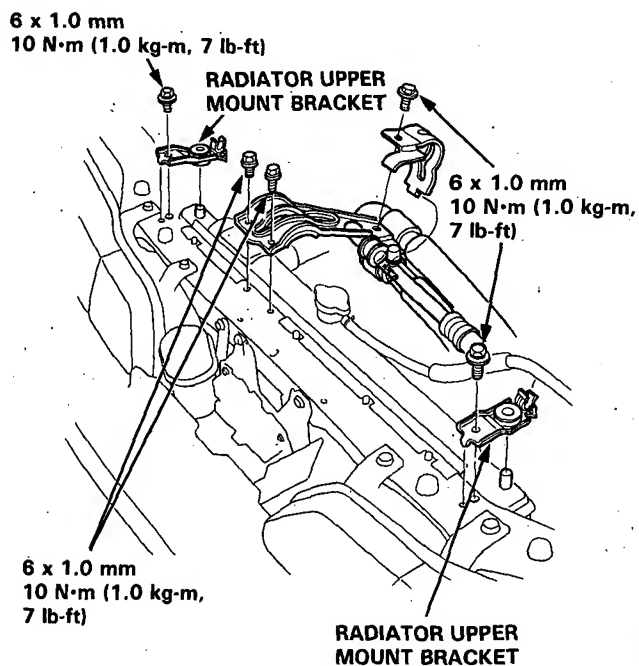
# Condenser

## Replacement

1. Use the refrigerant recovery/recycling system to recover the refrigerant from the system (see page 22-24).
2. Disconnect the engine ground cable.
3. Remove the radiator reservoir tank and the air intake tube.

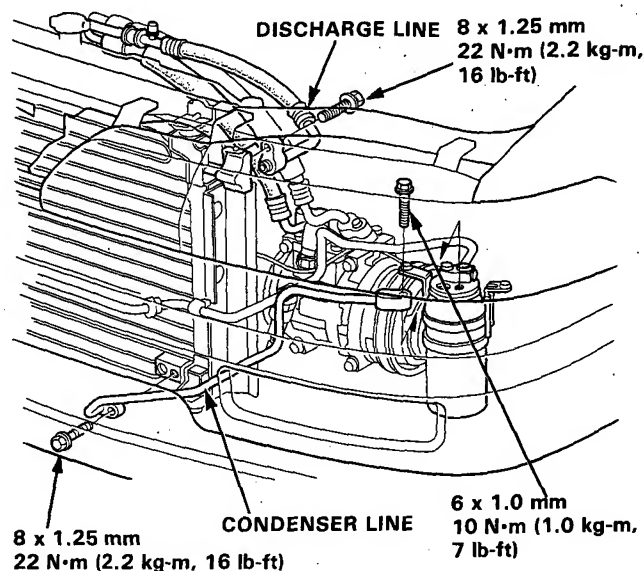


4. Remove the A/C hose bracket and the radiator upper mounting brackets.

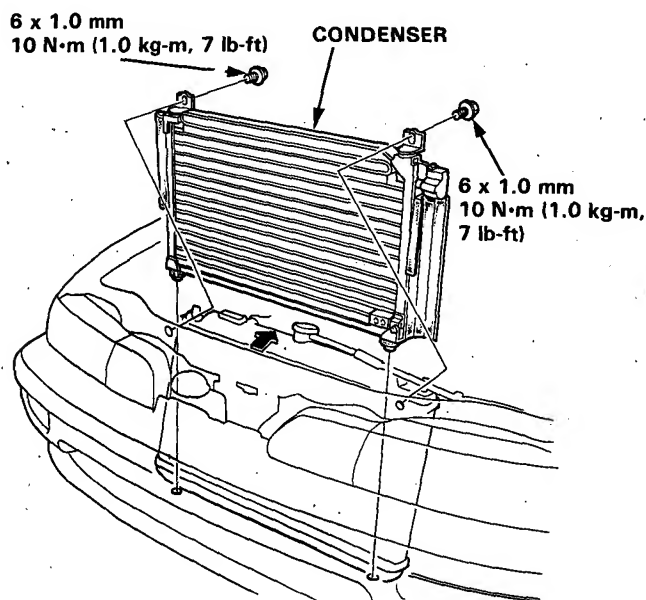


5. Disconnect the condenser and discharge lines from the condenser.

**CAUTION:** Cap the open fittings immediately to keep moisture and dirt out of system.



6. Remove the two mounting bolts and condenser.



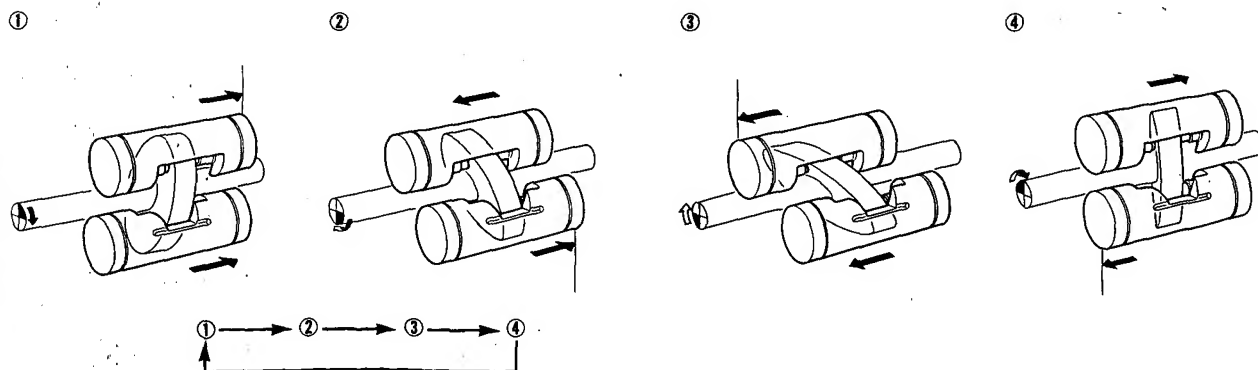
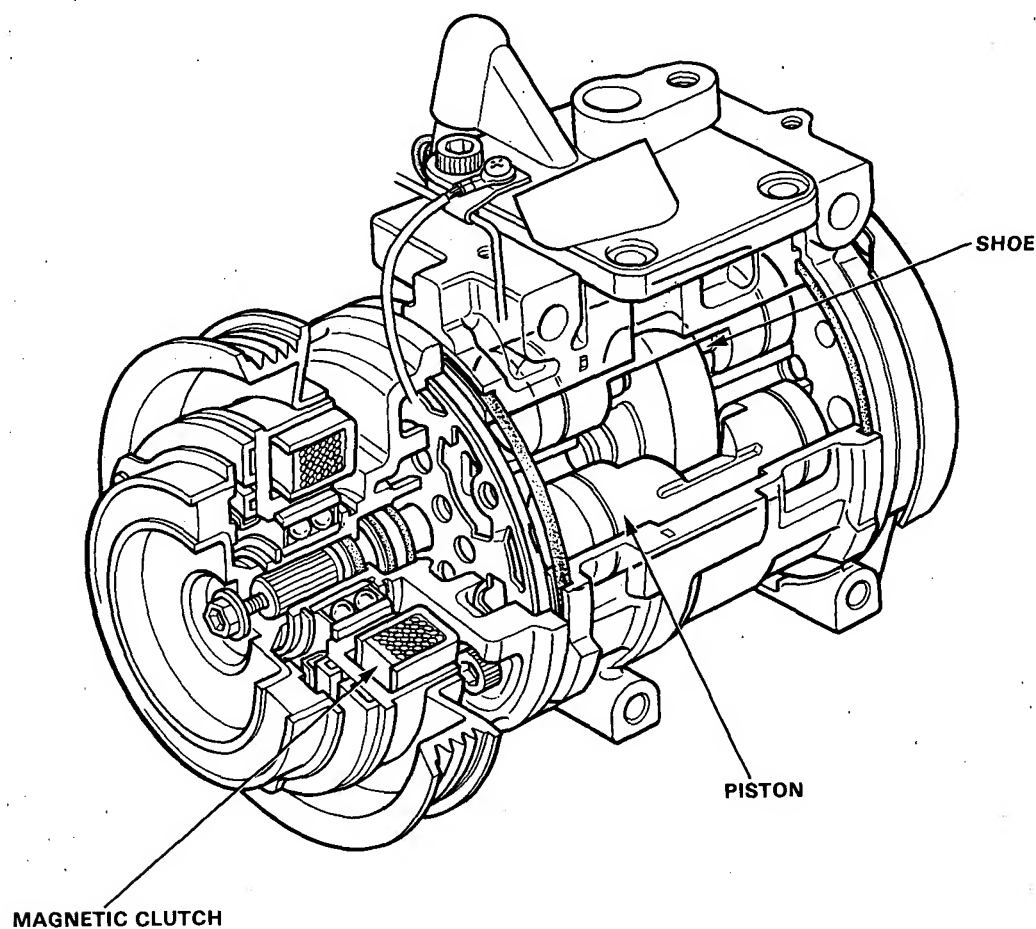
7. Install in the reverse order of removal, charge the system (see page 22-39) and test performance (see page 22-22).

# Compressor (Nippondenso)



## Description

This compressor is a piston type. A revolving inclined disc drives the surrounding five reciprocating pistons. As the inclined disc revolves, it pushes the pistons, protected by a ceramic shoe, thus compressing the refrigerant.



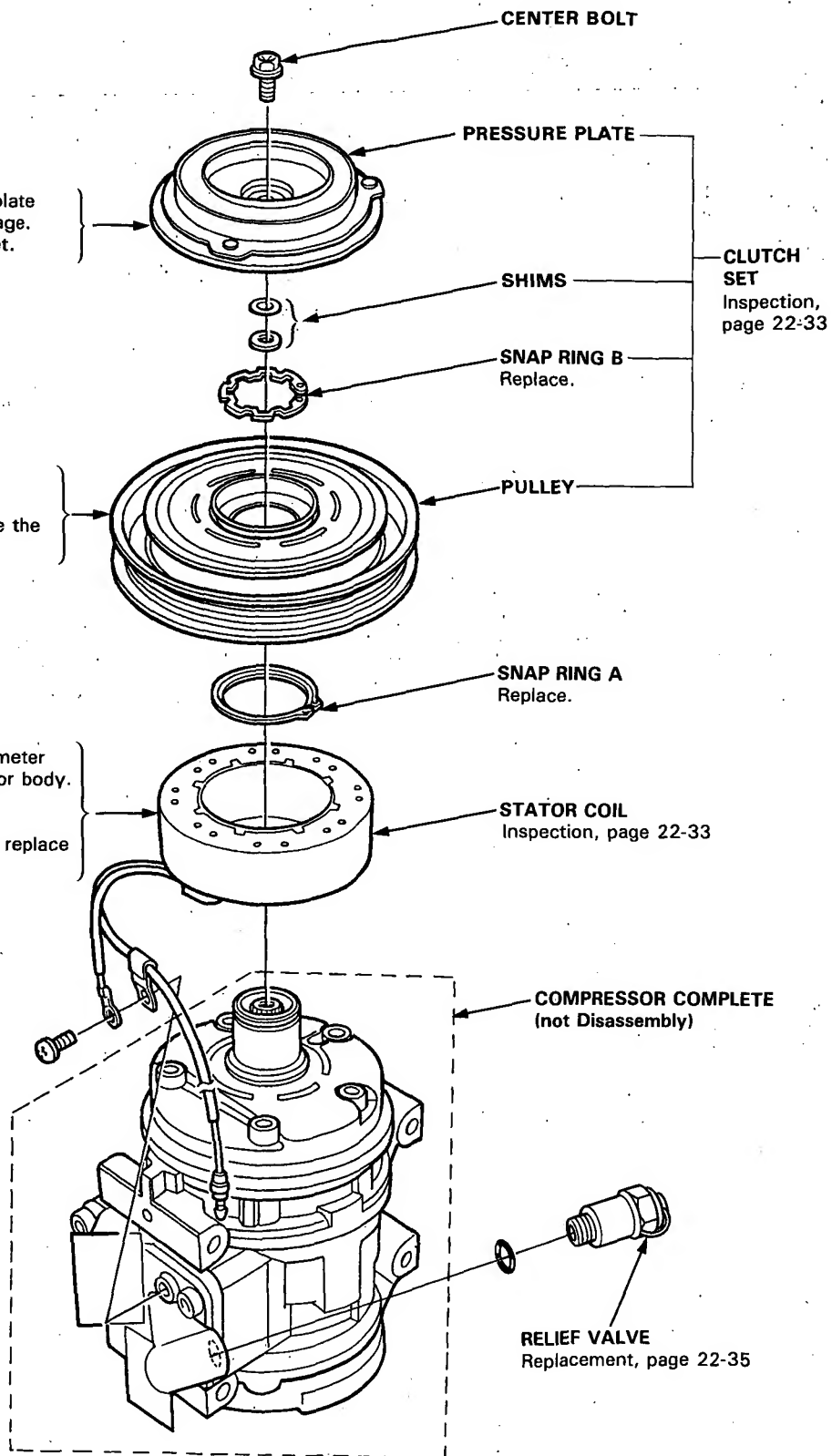
# Compressor

## Illustrated Index

Check the plated parts of the pressure plate for color changes, peeling or other damage. If there is damage, replace the clutch set.

Turn the pulley and check for excessive bearing play or drag. If there is excessive play or drag, replace the clutch set.

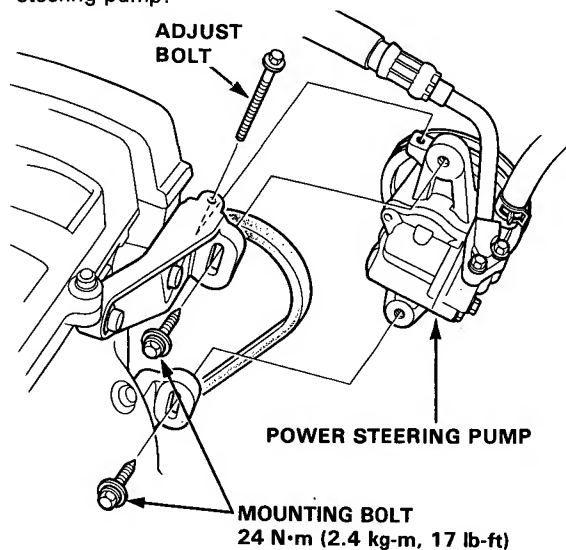
Check resistance by connecting an ohmmeter to the stator coil wire and the compressor body. Stator Coil Resistance:  $3.6 \pm 0.2$  ohm at 68°F (20°C). If resistance is not within specifications, replace the stator coil.





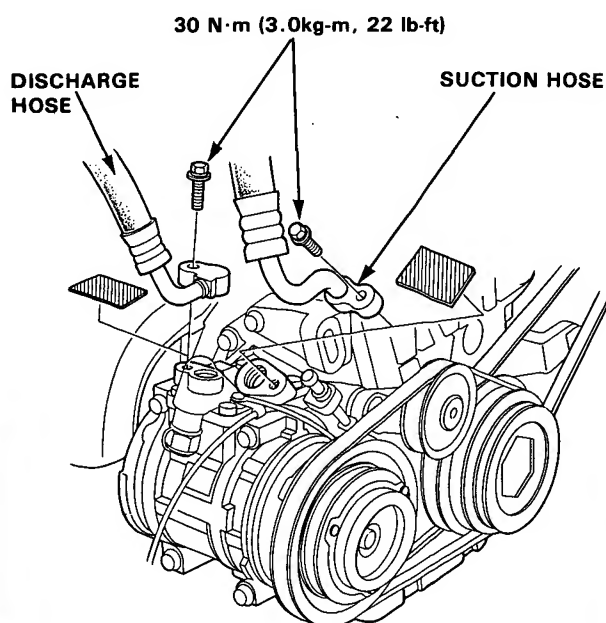
## Replacement

1. If the compressor is marginally operable, run the engine at idle speed and turn on the air conditioning fan a few minutes, then shut the engine off, and disconnect the negative cable from the battery.
2. Use the refrigerant recovery/recycling system to recover the refrigerant from the system (see page 22-24).
3. Loosen the adjust bolt, remove the two mounting bolts, the power steering pump belt, and the power steering pump.

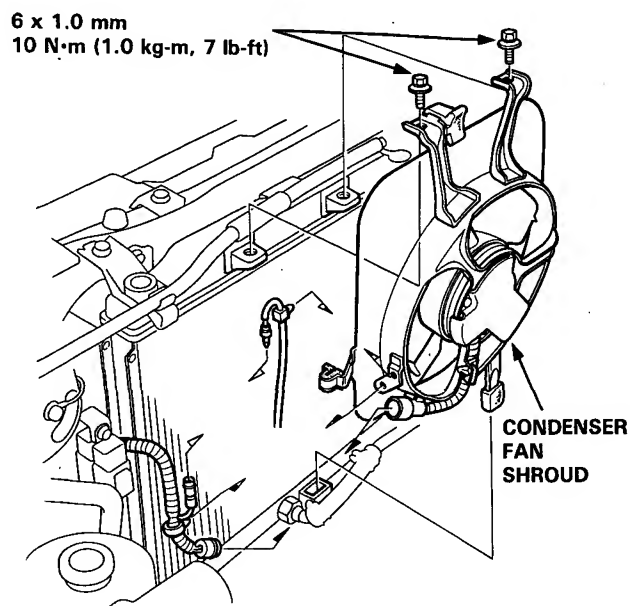


4. Disconnect the suction and discharge hoses from the compressor.

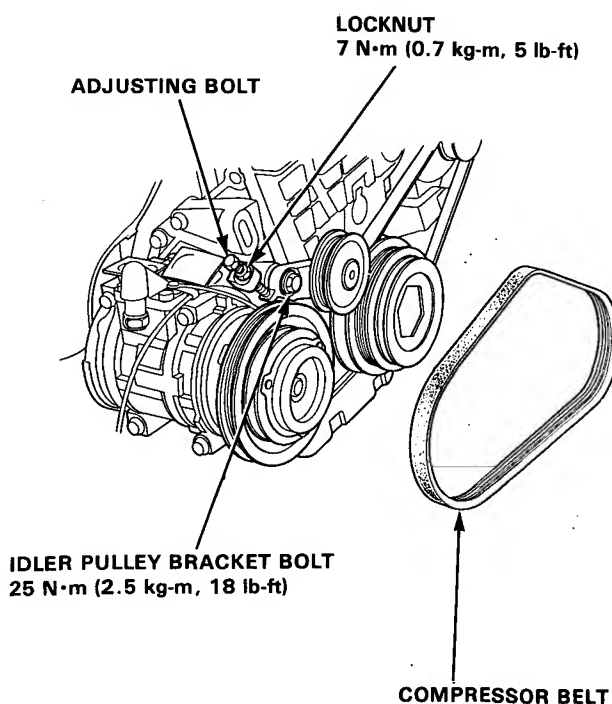
**CAUTION:** Cap the open fittings immediately to keep moisture and dirt out of the system.



5. Disconnect the compressor connector, and remove the condenser fan shroud.



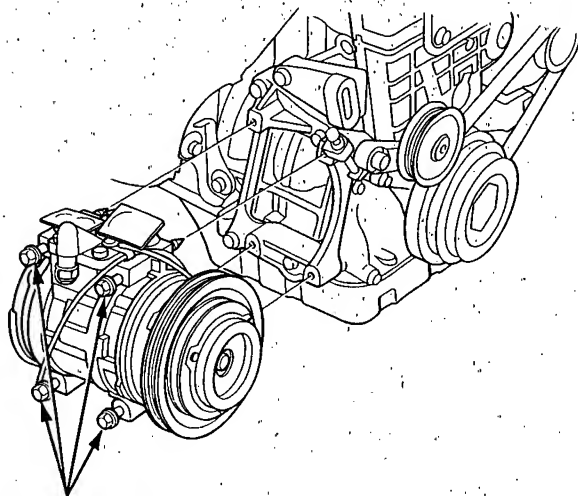
6. Loosen the idler pulley bracket bolt. Loosen the lock nut and adjusting bolt, then remove the compressor belt.



# Compressor

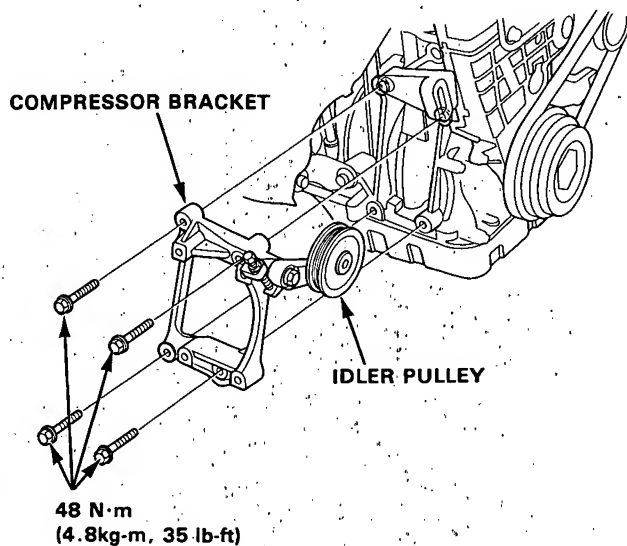
7. Remove the four compressor mounting bolts and compressor. Rest the compressor on the front beam.

NOTE: Do not damage the radiator fins.



**MOUNTING BOLTS**  
25 N·m  
(2.5kg-m, 18 lb-ft)

8. Remove the four mounting bolts and compressor bracket with idler pulley.



9. Remove the compressor.

NOTE: Do not damage the radiator fins.

10. Install in the reverse order of removal and:

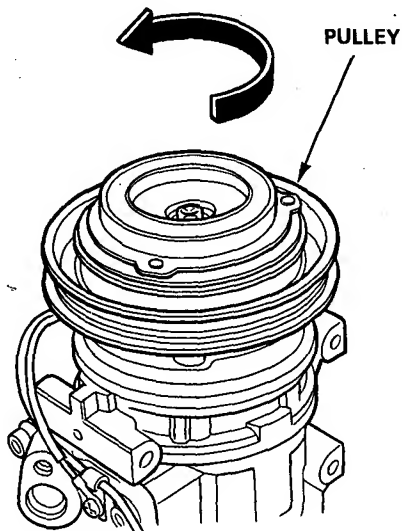
- If a new compressor is installed, calculate the amount of refrigerant oil in the system by draining the oil through the suction fitting on the old compressor:  
80 cc (2 2/3 fl oz) minus contents of old compressor, equals the amount of refrigerant oil to be drained from new compressor.
- Adjust the belt (see page 22-36)
- Charge the system (see page 22-39)
- Test the performance (see page 22-22)





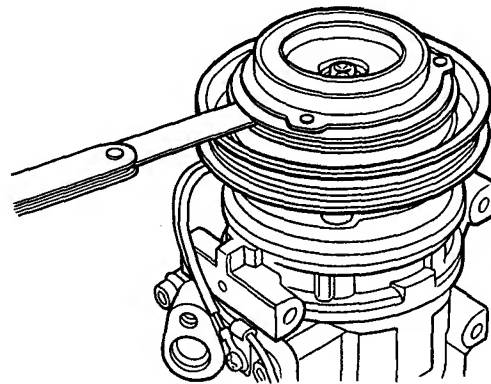
## Clutch Inspection

- Check pulley bearing play and drag by rotating the pulley by hand. Replace the clutch set with a new one if it noisy or has excessive play/drag.



- Measure the clearance between the pulley and pressure plate all the way around. If the clearance is not within specified limits, the pressure plate must be removed and shims added or removed as required.

**CLEARANCE:**  $0.5 \pm 0.15$  mm ( $0.020 \pm 0.006$  in)

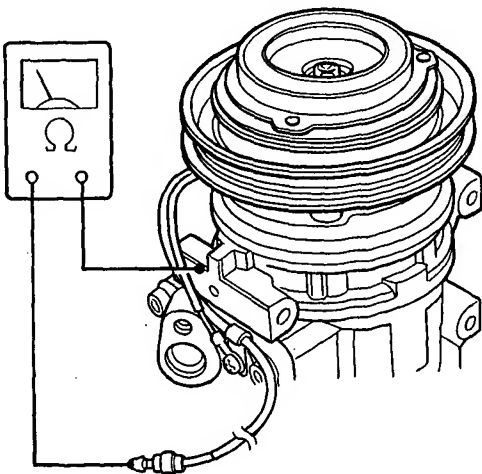


**NOTE:** The shims are available in two sizes: 0.1 mm, 0.3 mm and 0.5 mm of thickness.

- Check resistance of the stator coil:

**Stator Coil Resistance:**  $3.6 \pm 0.2$  ohm at  
68°F (20°C)

If resistance is not within specifications, replace the coil.



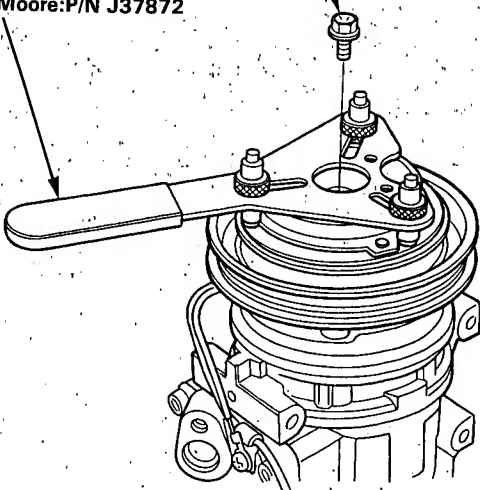
# Compressor

## Clutch Overhaul

1. Remove the center bolt.

A/C CLUTCH HOLDER  
commercially available.  
Robinair: P/N 10204  
Kent-Moore: P/N J37872

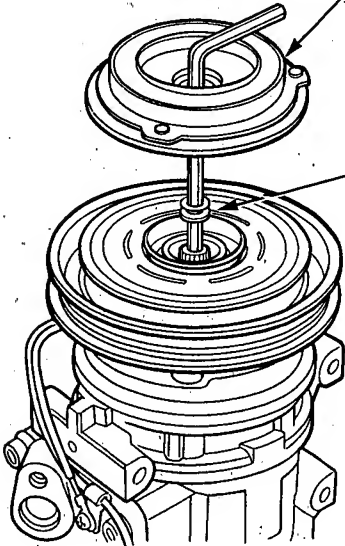
CENTER BOLT  
12 N·m (1.2kg-m, 9 lb-ft)



2. Remove the pressure plate and shim(s), taking care not to lose the shims.

PRESSURE  
PLATE

SHIM(S)



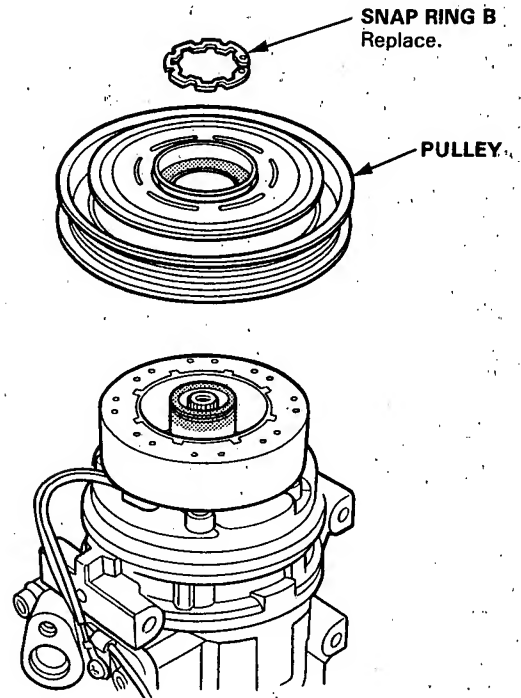
3. Use snap ring pliers to remove the snap ring B, then remove the pulley.

### NOTE:

- Once the snap ring B is removed, replace it with a new one.
- Be careful not to damage the compressor body and pulley.

SNAP RING B  
Replace.

PULLEY



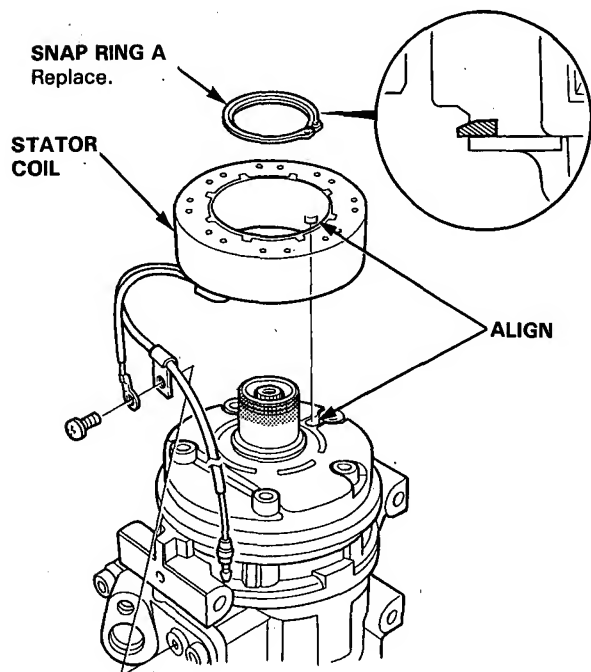


## Clutch Overhaul

6. Remove the snap ring A and the stator coil.

**NOTE:**

- Once the snap ring A is removed, replace it with a new one.
- When installing the field coil, align the boss on the field coil with the hole in the compressor.



7. Install in the reverse order of removal and:

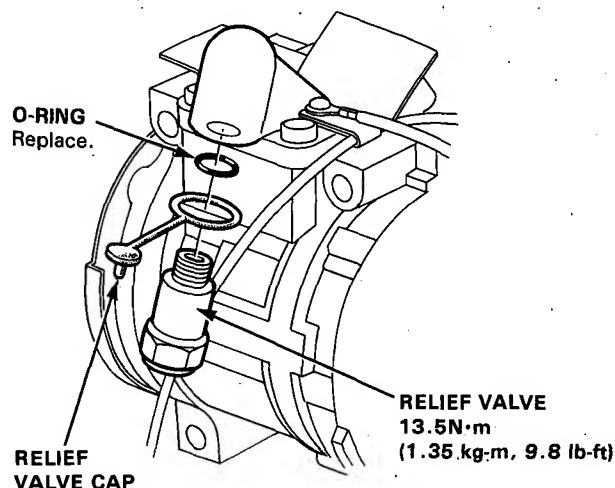
- Install the stator coil with the wire side facing up (see above).
- Clean the pulley and compressor sliding surfaces with non-petroleum solvent.
- Check the pulley bearings for excessive play.
- Make sure the snap ring is fitted to the groove properly.
- Apply locking agent to the thread of the center bolt and tighten it securely.
- Make sure that the pulley turns smoothly.

## Relief Valve Replacement

**NOTE:** Make sure the suction and discharge ports are plugged with caps.

1. Remove the relief valve, O-ring, and relief valve cap.

**CAUTION:** Do not let the compressor oil run out. Make sure there is no foreign matter in system.



2. Install the new valve.

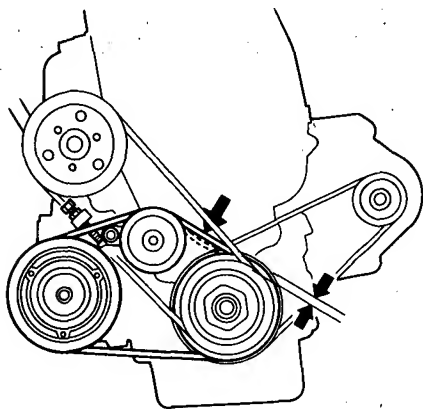
- Clean off the O-ring seat in the port.
- Replace the relief valve O-ring with a new one. Apply a thin coat of refrigerant oil before installing it.
- Check for leaks, and insert the cap in the top of the valve.

# Belt Tension

## Compressor Belt

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.

Belt tension in mm of deflection under a force of about 98 N (10 kg, 22 lbs)	
New belt	Used belt
4.5–6.5 mm (0.18–0.26 in)	7.0–9.0 mm (0.28–0.35 in)

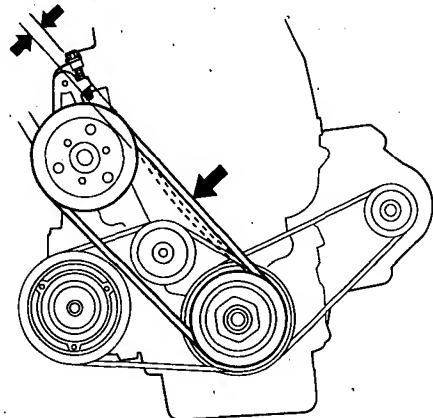


Belt tension gauge (07JGG-001010A)	
New belt	Used belt
550–750 N (55–75 kg, 121–154 lbs)	350–500 N (35–50 kg, 77–110 lbs)

## Power Steering Belt

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.

Belt tension in mm of deflection under a force of about 98 N (10 kg, 22 lbs)	
New belt	Used belt
6.8–8.0 mm (0.24–0.31 in)	9.5–11.5 mm (0.37–0.45 in)



Belt tension gauge (07JGG-001010A)	
New belt	Used belt
600–800 N (60–80 kg, 132–176 lbs)	350–450 N (35–45 kg, 77–99 lbs)



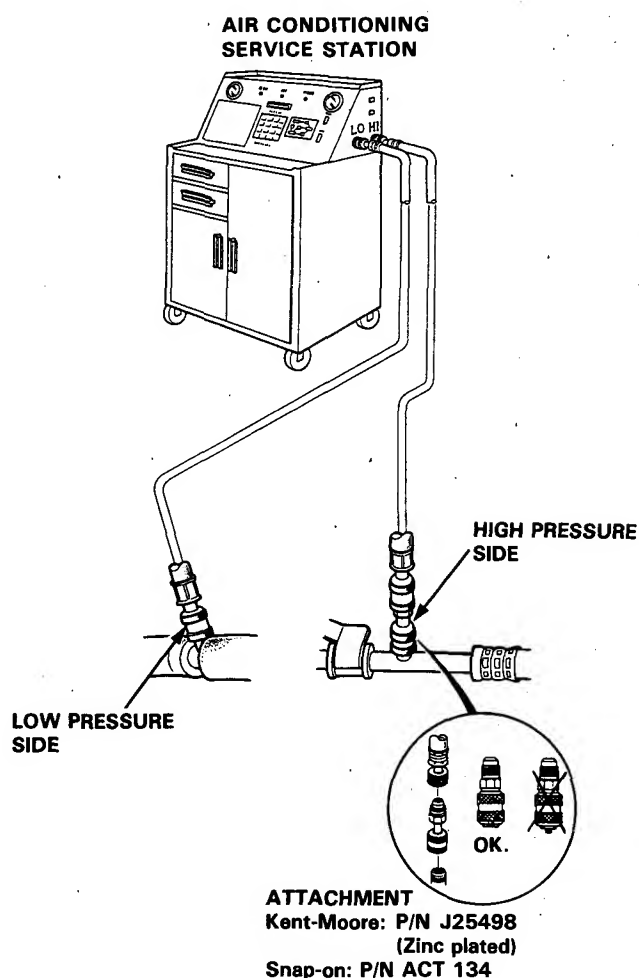
## Evacuation

1. When an A/C System has been opened to the atmosphere, such as during installation or repair, it must be evacuated using a vacuum pump. (If the system has been open for several days, the receiver/dryer should be replaced).
2. Connect the Air Conditioning Service Station as shown.  
Follow the equipment manufacturer's instructions.

### NOTE:

- Connect the adapter to the high pressure hose first, then connect the hoses to the car as shown. When testing is completed, disconnect the hose adapter from the high-side fitting; do not disconnect the hose from the adapter, or refrigerant may escape from the system.
- If low pressure does not reach more than 700 mm Hg (27 in-Hg) in 15 minutes, there is probably a leak in the system. Partially charge the system and check for leaks (see Leak Test next page).

**CAUTION: Use only a R-12 refrigerant Air Conditioning Service Station.**



# A/C System Service

## Leak Test

**⚠ WARNING** When handling refrigerant (R-12):

- Always wear eye protection.
- Do not let refrigerant get on your skin or in your eyes. If it does:
  - Do not rub your eyes or skin.
  - Splash large quantities of cool water in your eyes or on your skin.
  - Rush to a physician or hospital for immediate treatment. Do not attempt to treat it yourself.
- Keep away from open flames. refrigerant, although non-flammable, will produce a poisonous gas if burned.
- Work in a well-ventilated area. Refrigerant evaporates quickly, and can force all the air out of a small, enclosed area.

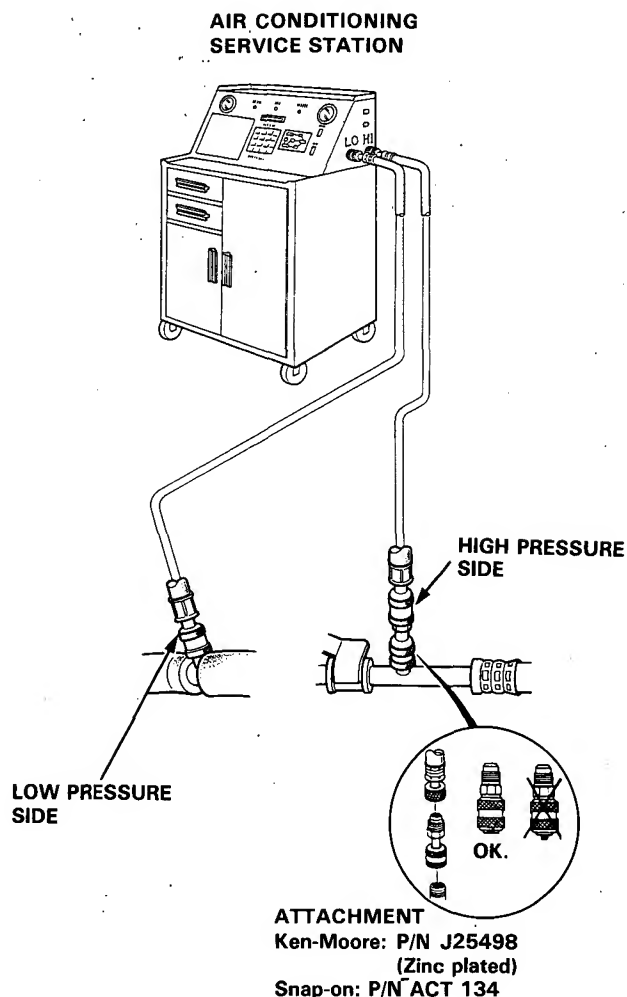
**IMPORTANT:** Do not vent refrigerant to the atmosphere. The chlorofluorocarbons (CFCs) used in conventional refrigerant (R-12) may damage the earth's ozone layer. Always use UL-listed, refrigerant recovery/recycling system equipment to extract the refrigerant before you open an A/C system to make repairs. Follow the equipment manufacturer's instructions.

1. Connect the Air Conditioning Service Station as shown.

**NOTE:** Connect the adapter to the high pressure hose first, then connect the hoses to the car as shown. When testing is completed, disconnect the hose adapter from the high-side fitting; do not disconnect the hose from the adapter, or refrigerant may escape from the system.

2. Open the high-pressure supply valve to charge the system to about 100 kPa (1 kg/cm<sup>2</sup>, 14 psi), then close the supply valve.
3. Check the system for leaks using a leak detector.
4. If you find leaks that require the system to be opened (to repair or replace hoses, fittings, etc.), recover the system according to the Recovery on page 22-24.
5. After checking and repairing leaks, evacuate the system (see Evacuation on page 22-37).

**CAUTION:** Use only a R-12 refrigerant Air Conditioning Service Station.





## Charging

Refrigerant capacity: 900—950g (32—34 oz)

**⚠ WARNING** Always wear eye protection when charging the system.

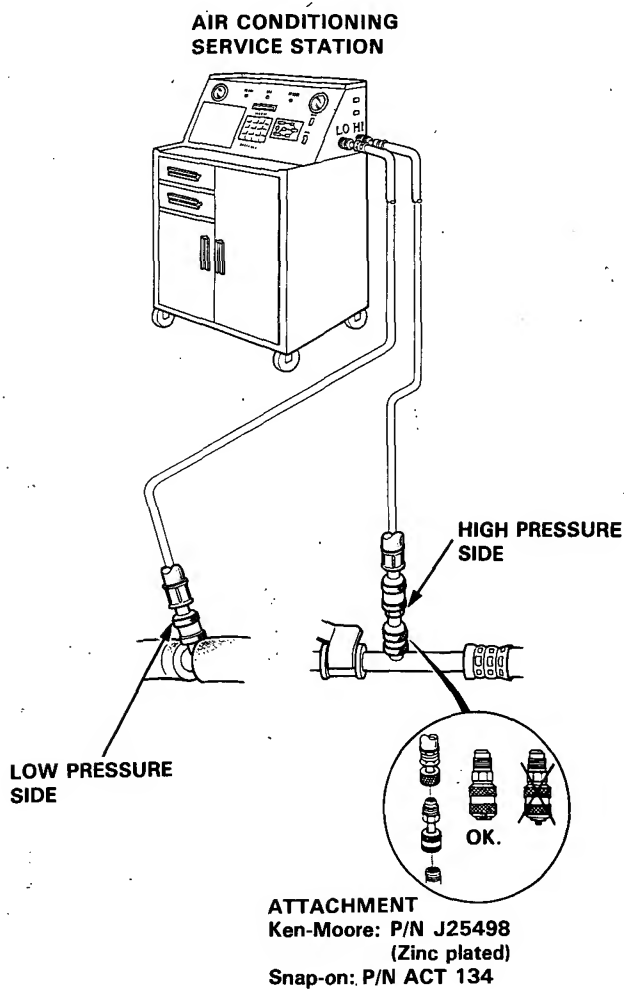
**CAUTION:** Do not overcharge the system; the compressor will be damaged.

Connect the Air Conditioning Service Station as shown.

Follow the equipment manufacturer's instructions.

**NOTE:** Connect the adapter to the high pressure hose first, then connect the hoses to the car as shown. When testing is completed, disconnect the hose adapter from the high-side fitting; do not disconnect the hose from the adapter, or refrigerant may escape from the system.

**CAUTION:** Use only a R-12 refrigerant Air Conditioning Service Station.







# Electrical

Special Tools ..... 23-2

## How to Use This Section

Tips and Precautions ..... 23-3

Five-step Troubleshooting ..... 23-5

Schematic Symbols ..... 23-6

Wire Color Codes ..... 23-6

## Relays and Control Unit Locations

Engine Compartment ..... 23-7

Dashboard ..... 23-8

Door, Floor, and Quarter panel ..... 23-11

## Index to Circuit and Systems

Air Conditioner ..... Section 21

Alternator ..... 23-90

Antenna, Power ..... 23-173

Anti-lock Brake System ..... Section 19

## Automatic Transmission

Control System ..... Section 14

Battery ..... 23-56

Blower controls ..... Section 21

Charging System ..... 23-90

Cigarette Lighter ..... 23-179

Clock ..... 23-177

Cruise Control ..... 23-223

Defogger, Rear Window ..... 23-187

Fuel Pump ..... Section 11

## Fuses

Under-hood Main Fuse Box ..... 23-40

Under-dash Fuse/Relay Box ..... 23-41

## Gauge Assembly

Circuit Diagram ..... 23-110

Engine Coolant Temperature (ECT) Gauge ..... 23-117

Fuel Gauge ..... 23-118

Speedometer ..... 23-110

Tachometer ..... 23-110

## Grounds

Distribution ..... 23-50

Locations ..... 23-13

Heater Controls ..... Section 21

Horns ..... 23-181

Ignition Switch ..... 23-58

Ignition System ..... 23-76

Ignition Timing Inspection ..... 23-79

## Indicators

High Beam Indicator ..... 23-143

A/T Gear Position Indicator ..... 23-126

Turn Signal Indicator ..... 23-163

Integrated Control Unit ..... 23-132

Interlock System ..... 23-120

## Lights, Exterior

Back-up Lights ..... 23-158

Brake Lights ..... 23-160

Daytime Running Lights (Canada) ..... 23-146

Hazard Warning Lights ..... 23-163

Headlights Adjustment ..... 23-143

High Mount Brake Light ..... 23-161

License Plate Lights ..... 23-152

Front Parking/Front Side Marker Lights ... 23-153

Taillights ..... 23-151

Turn Signal Lights ..... 23-152

## Lights, Interior

Dash Lights Brightness Control ..... 23-168

Ceiling Light ..... 23-154

Glove Box Light ..... 23-153

Front Map Light ..... 23-155

Trunk/Cargo Area Light ..... 23-156

Lighting System ..... 23-143

Locks, Power ..... 23-196

Mirror, Power ..... 23-183

Moonroof ..... 23-192

PGM-FI System ..... Section 11

Power Distribution ..... 23-42

Radiator and Condenser Fan Controls ..... 23-102

Relay Locations ..... 23-9

Spark Plugs ..... 23-87

Starting System ..... 23-63

Stereo Sound System ..... 23-170

Side Marker/Turn Signal/Hazard

Flasher System ..... 23-163

Washer, Windshield ..... 23-215

Windows, Power ..... 23-206

Wipers, Windshield ..... 23-215

## Wires, Harnesses and Connectors

Connectors Identification ..... 23-13

Wire Color Codes ..... 23-6

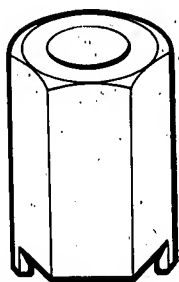
Wire Harness Routing ..... 23-13

Wiring Diagrams ..... 23-252

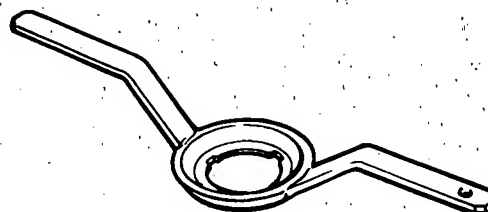
# Special Tools

## Special Tools

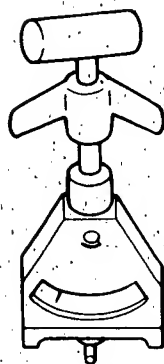
Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07JAA-001000B	Antenna Nut Wrench	1	23-174, 175
②	07920-SB20000 or 07NAC-SR20100	Fuel Sender Wrench	1	23-119
③	07JGG-0010100A	Belt Tension Gauge	1	23-101



①



②



③

# Troubleshooting

## Tips and Precautions

### Before Troubleshooting

#### NOTE:

The radio may have a coded theft protection circuit.

Be sure to get the customer's code number before

- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse.  
(in the under-dash fuse/relay box)
- Removing the radio.

After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

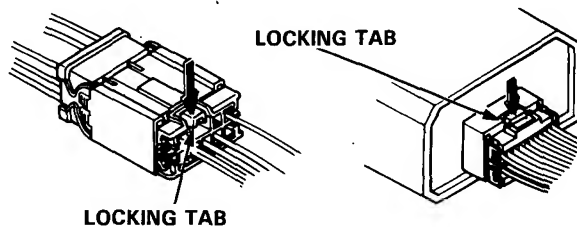
- Check applicable fuses in the appropriate fuse box.
- Check the battery for damage, state of charge, and clean and tight connections.
- Check the alternator belt tension.

#### CAUTION:

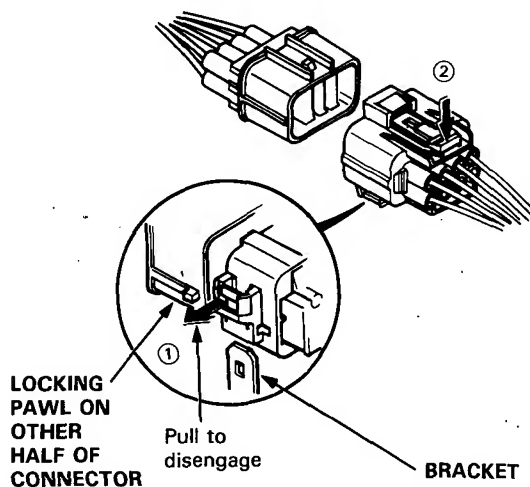
- Do not quick-charge a battery unless the battery ground cable has been disconnected. Otherwise you will damage the alternator diodes.
- Do not attempt to crank the engine with the battery ground cable loosely connected or you will severely damage the wiring.

### Handling Connectors

- Make sure the connectors are clean and have no loose wire terminals.
- Make sure multiple cavity connectors are packed with grease (except watertight connectors).
- All connectors have push-down release type locks.



- Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
- Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its bracket.

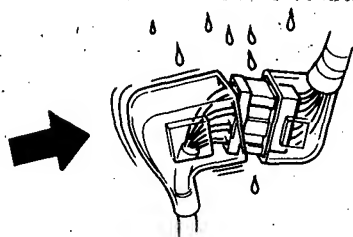


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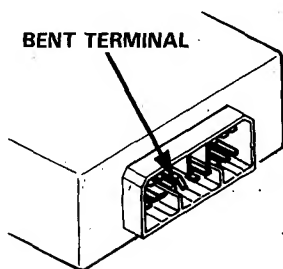
# Troubleshooting

## Tips and Precautions (cont'd)

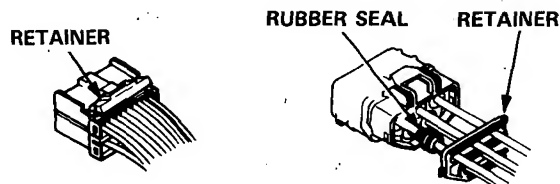
- Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.
- Always reinstall plastic covers.



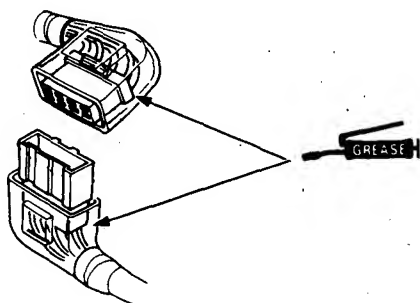
- Before connecting connectors, make sure the terminals are in place and not bent.



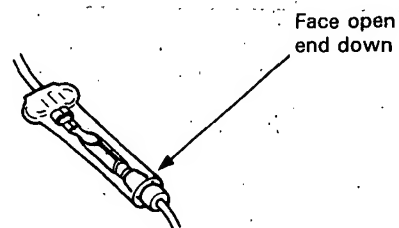
- Check for loose retainer and rubber seals.



- The backs of some connectors are packed with grease. Add grease if it's needed. If the grease is contaminated, replace it.

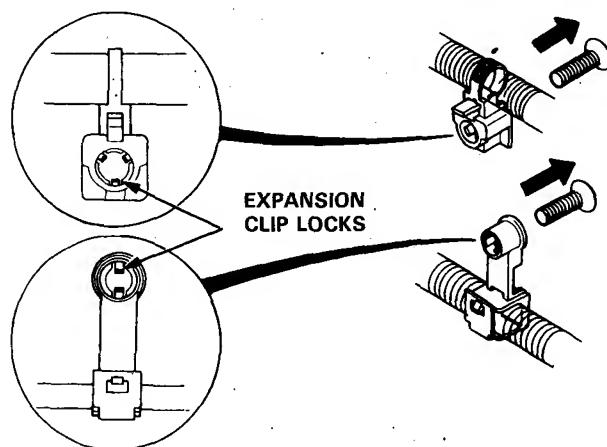


- Insert the connector all the way and make sure it is securely locked.
- Position wires so that the open end of the cover faces down.

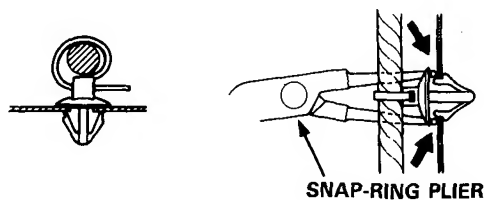


## Handling Wires and Harnesses

- Secure wires and wire harnesses to the frame with their respective wire ties at the designated locations.
- Remove clips carefully; don't damage their locks.



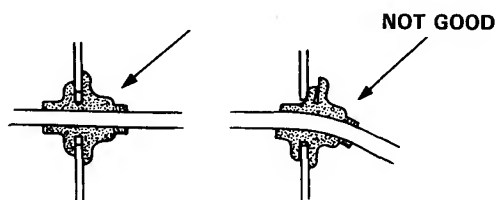
Slip pliers under the clip base and through the hole at an angle, then squeeze the expansion tabs to release the clip.



- After installing harness clips, make sure the harness doesn't interfere with any moving parts.
- Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.

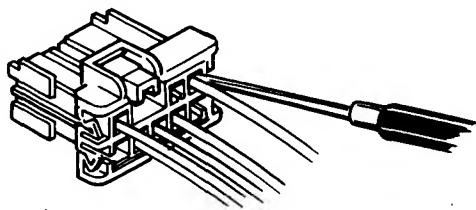


- Seat grommets in their grooves properly.

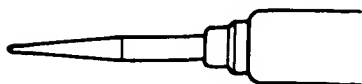


### Testing and Repairs

- Do not use wires or harnesses with broken insulation. Replace them or repair them by wrapping the break with electrical tape.
- After installing parts, make sure that no wires are pinched under them.
- When using electrical test equipment, follow the manufacturer's instructions and those described in this manual.
- If possible, insert the probe of the tester from the wire side (except waterproof connector).



- Use a probe with a tapered tip.



- Refer to the instructions in the Honda Terminal Kit for identification and replacement of connector terminals.

## Five-step Troubleshooting

### 1. Verify The Complaint

Turn on all the components in the problem circuit to verify the customer complaint. Note the symptoms. Do not begin disassembly or testing until you have narrowed down the problem area.

### 2. Analyze The Schematic

Look up the schematic for the problem circuit. Determine how the circuit is supposed to work by tracing the current paths from the power feed through the circuit components to ground. If several circuits fail at the same time, the fuse or ground is a likely cause.

Based on the symptoms and your understanding of the circuit operation, identify one or more possible causes of the problem.

### 3. Isolate The Problem By Testing The Circuit

Make circuit tests to check the diagnosis you made in step 2. Keep in mind that a logical, simple procedure is the key to efficient troubleshooting. Test for the most likely cause of failure first. Try to make tests at points that are easily accessible.

### 4. Fix The Problem

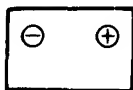
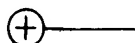






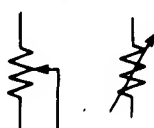
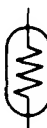










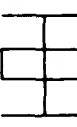
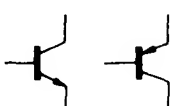
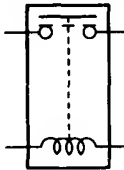
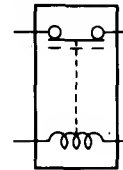



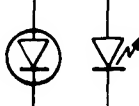


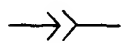
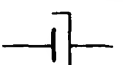

Once the specific problem is identified, make the repair. Be sure to use proper tools and safe procedures.

### 5. Make Sure The Circuit Works

Turn on all components in the repaired circuit in all modes to make sure you've fixed the entire problem. If the problem was a blown fuse, be sure to test all of the circuits on that fuse. Make sure no new problems turn up and original problem does not recur.

# Troubleshooting

## Schematic Symbols

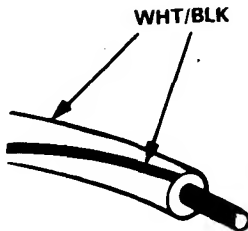
<b>BATTERY</b>  or 	<b>GROUND</b> Ground terminal  Component ground 		<b>FUSE</b> 	<b>COIL, SOLENOID</b> 	<b>CIGARETTE LIGHTER</b> 
<b>RESISTOR</b> 	<b>VARIABLE RESISTOR</b> 	<b>THERMISTOR</b> 	<b>IGNITION SWITCH</b> 	<b>BULB</b> 	<b>HEATER</b> 
<b>MOTOR</b> 	<b>PUMP</b> 	<b>CIRCUIT BREAKER</b> 	<b>HORN</b> 	<b>DIODE</b> 	<b>SPEAKER, BUZZER</b> 
<b>ANTENNA</b> Mast  Window 		<b>TRANSISTOR (Tr)</b> 			
<b>RELAY (In normal position)</b> Normally open relay  Normally closed relay 		<b>CONDENSER</b> 			
<b>SWITCH (In normal position)</b> Normally open switch  Normally closed switch 		<b>LIGHT EMITTING DIODE (LED)</b> 			
<b>CONNECTION</b> Input  Output 		<b>CONNECTOR</b> Male  Female 		<b>REED SWITCH</b> 	

### Wire Color Codes

The following abbreviations are used to identify wire colors in the circuit schematics.

WHT	White
YEL	Yellow
BLK	Black
BLU	Blue
GRN	Green
RED	Red
ORN	Orange
PNK	Pink
BRN	Brown
GRY	Gray
PUR	Purple
LT BLU	Light Blue
LT GRN	Light Green

The wire insulation has one color or one color with another color stripe. The second color is the stripe.

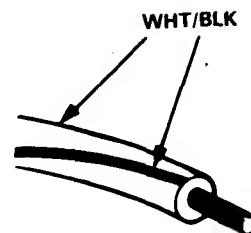


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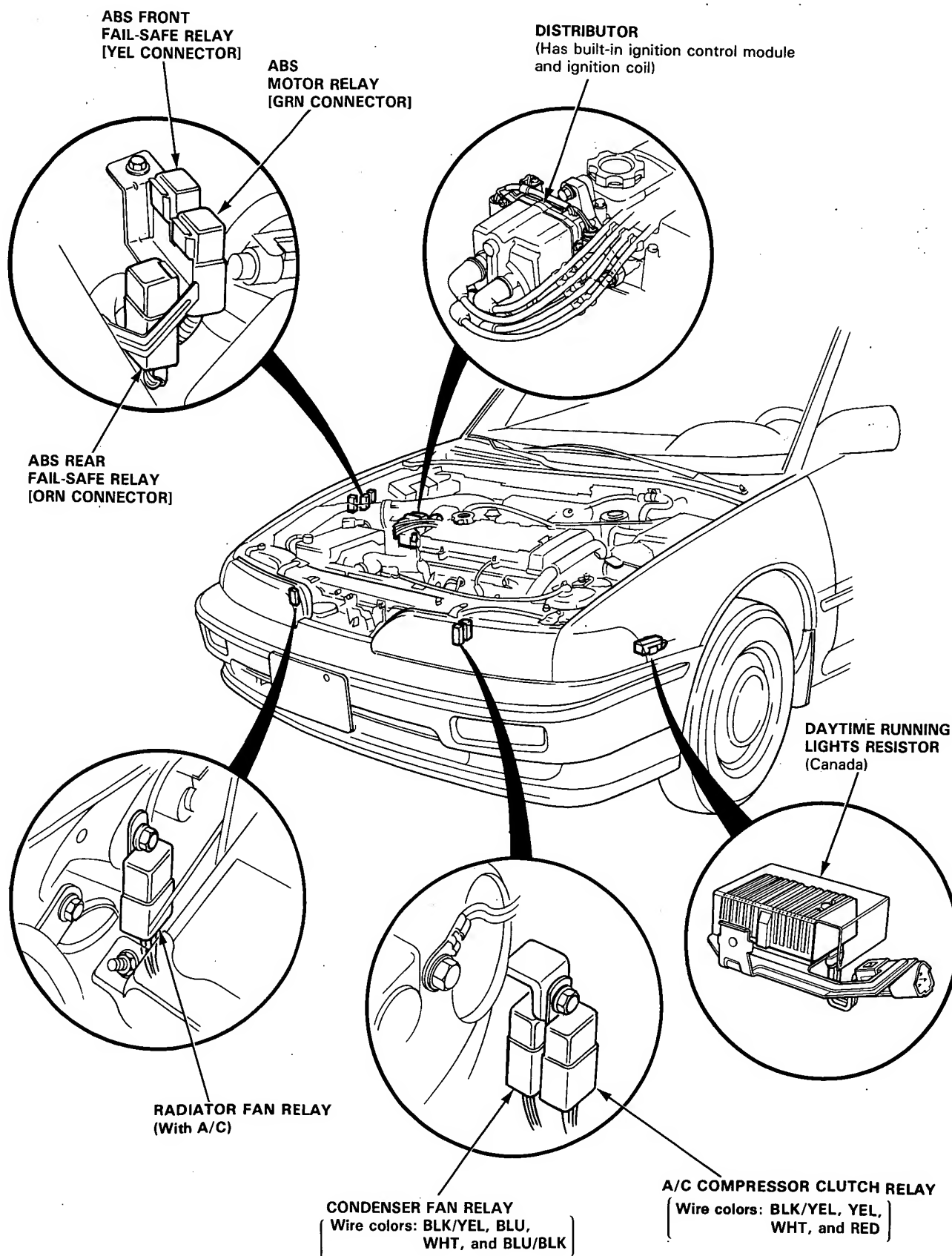
The wire insulation has one color or one color with another color stripe. The second color is the stripe.





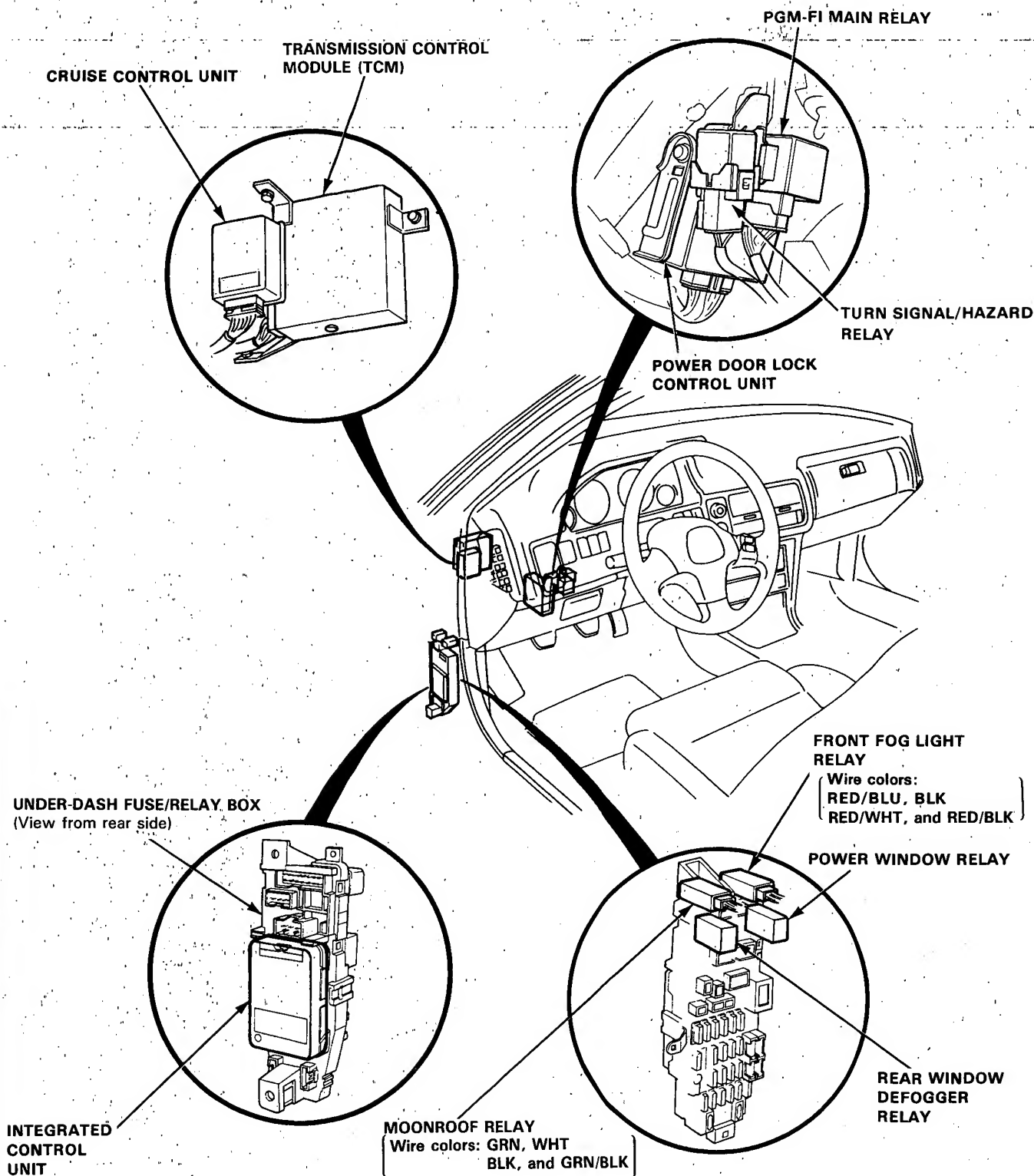
# Relay and Control Unit Locations

## Engine Compartment

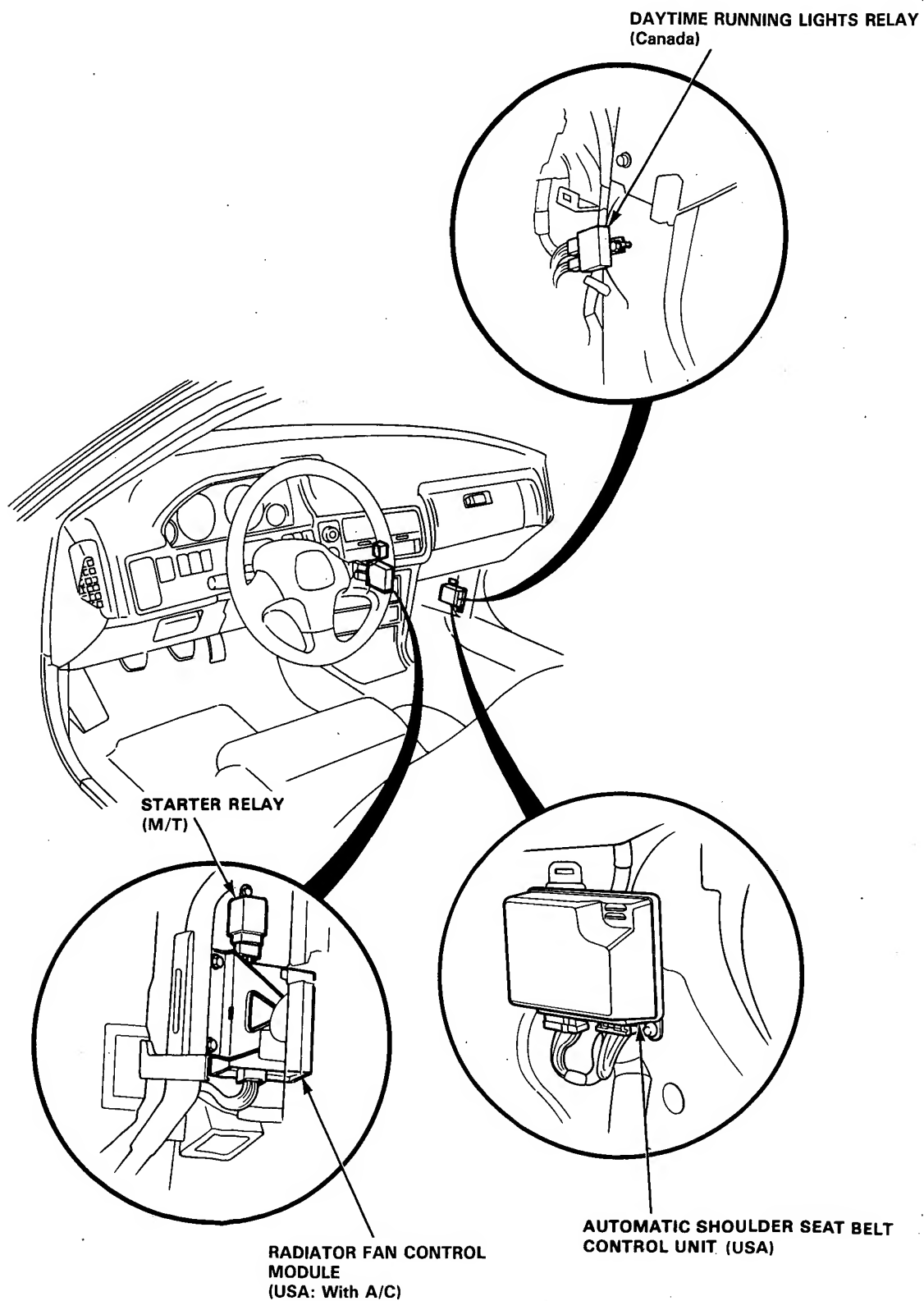


# Relay and Control Unit Locations

## Dashboard



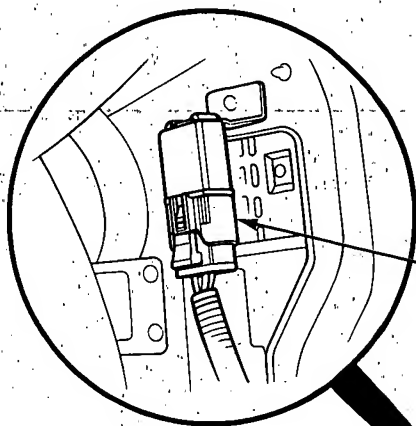




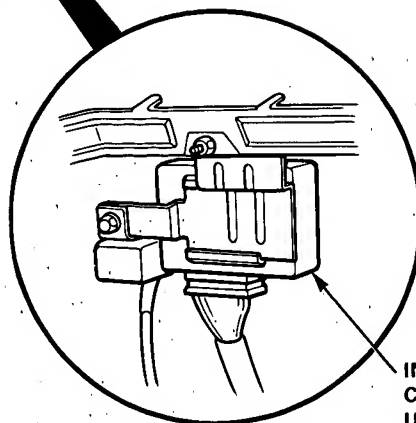
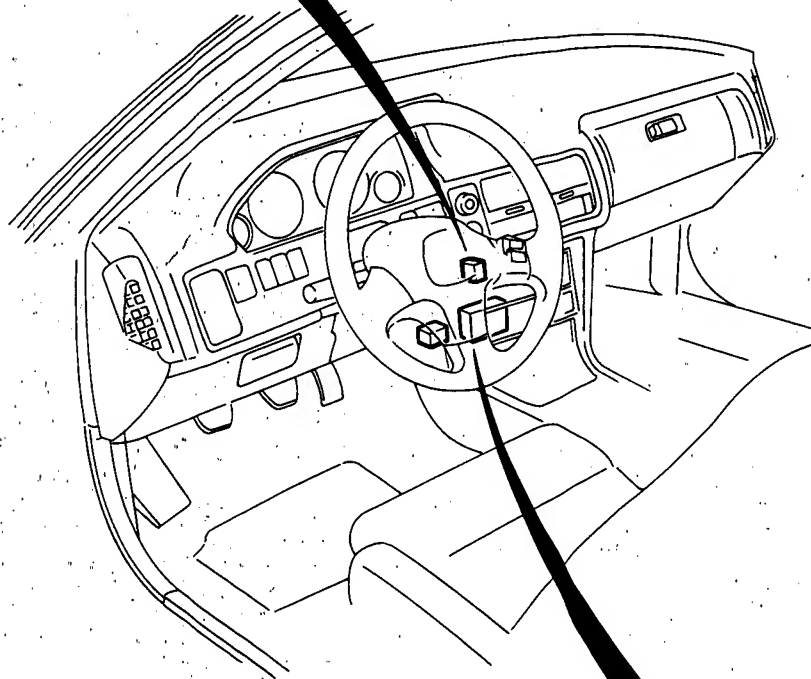
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# Relay and Control Unit Locations

Dashboard (cont'd)



CIGARETTE LIGHTER RELAY

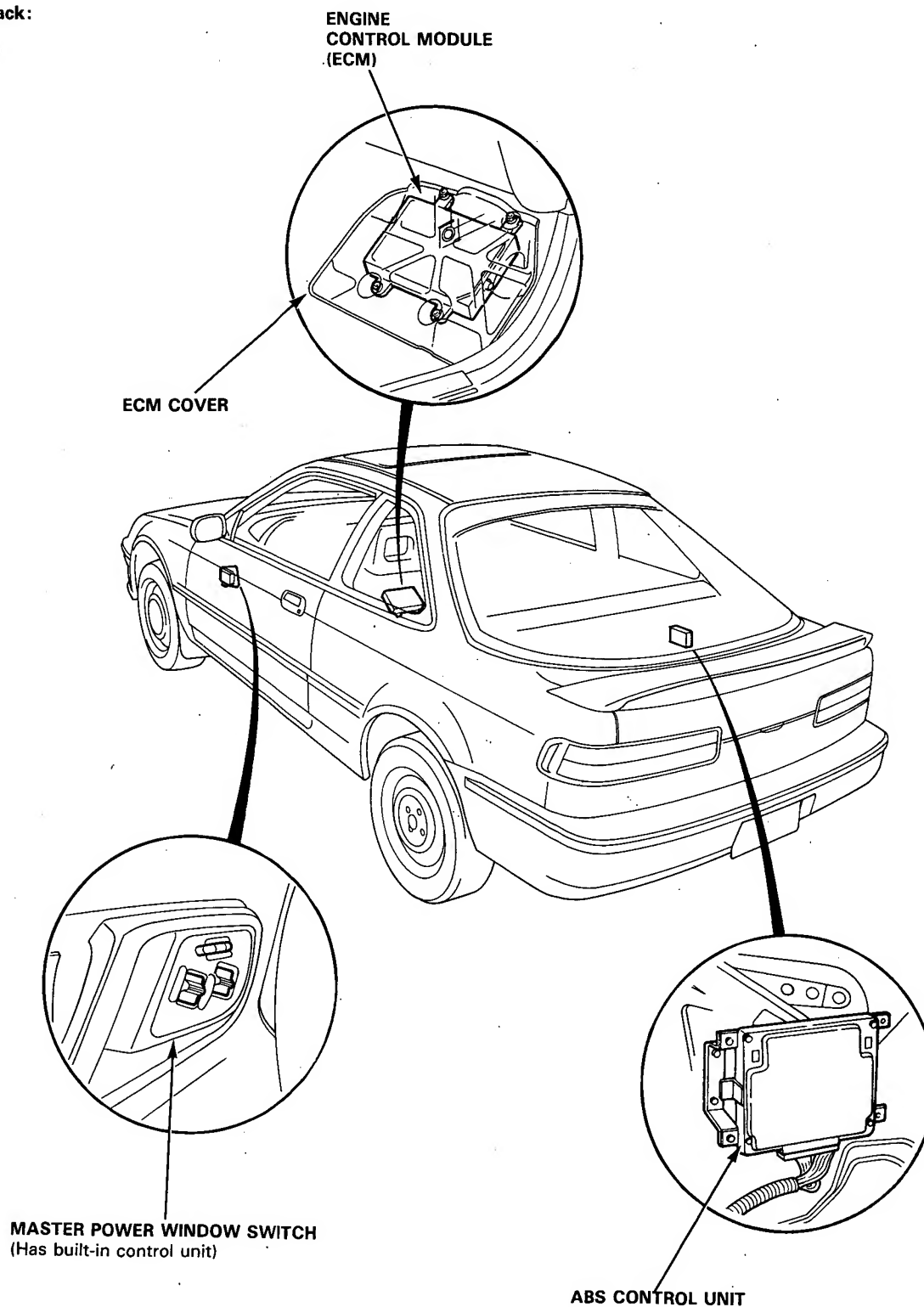


INTERLOCK  
CONTROL  
UNIT (A/T)



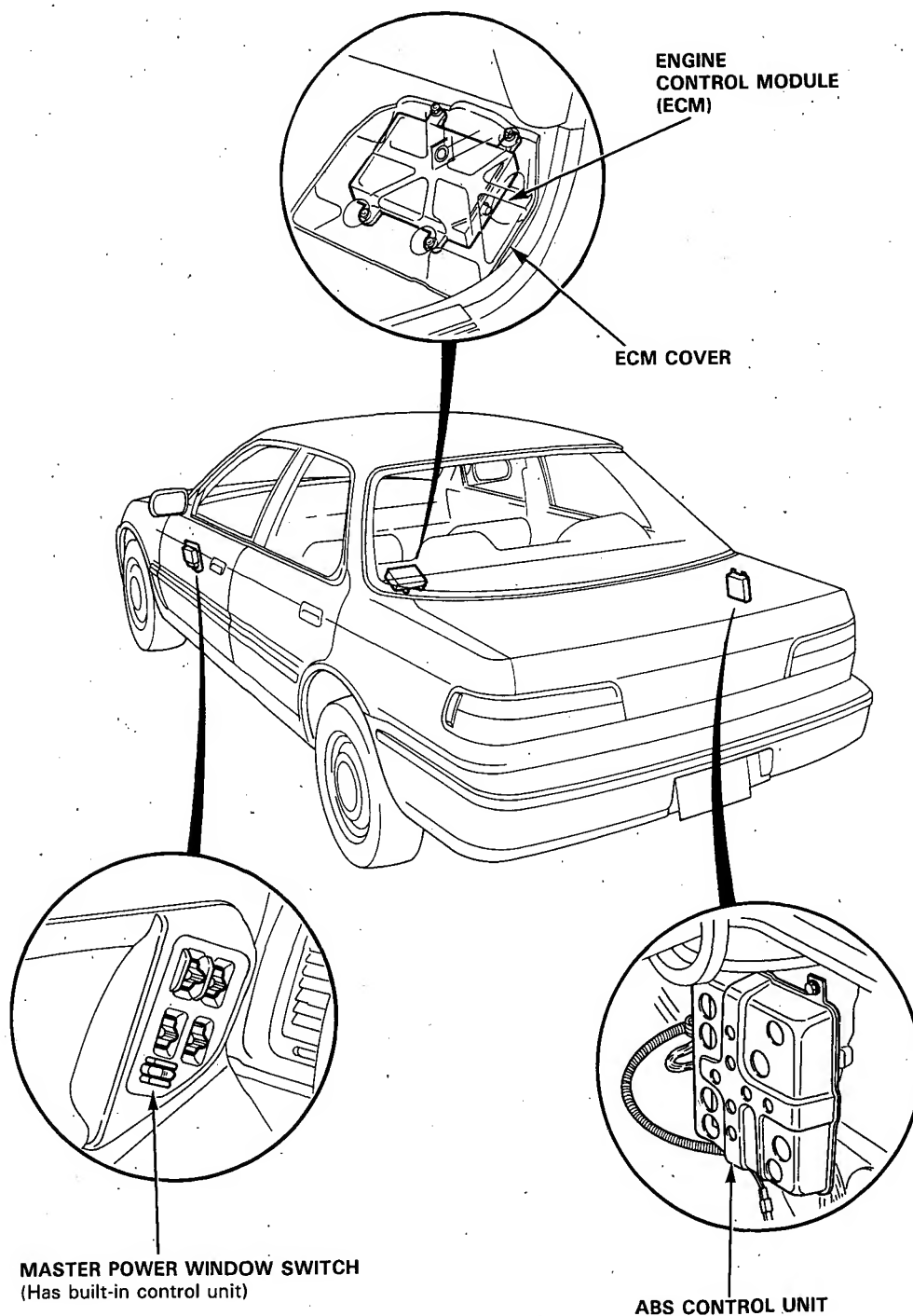
## Door, Floor and Quarter Panel

Hatchback:



# Relay and Control Unit Locations

Sedan:



# Connector Identification and Wire Harness Routing



## How to Identify Connectors:

Identification numbers have been assigned to all connectors. The number is preceded by the letter "C" for connectors, "G" for single ground terminals or "T" for single non-ground terminals.

Location		Engine Compartment	Dashboard	Others (Floor, Door, Trunk, Roof)
Harness				
Starter Cable		T1, T2 and ⊕		
Battery Ground Cable		T3 and ⊖ G1		
Engine Ground Cable		T4 and T5 G2		
Engine Wire Harness		C101 thru C131 T101 and T102 G101		
Main Wire Harness		C201 thru C228 C301 thru C319 T201 thru T203 G201 and G301	G401 thru C433 and C448 C439 thru C447 G401 and G402	C434 and C438
A/C Wire Harness		C281 thru C290 G281		
Rear Wire Harness	Hatchback		C501 thru C507 C516 thru C517 C510 thru C512 G501 and G502	C508, C509, C513 and C514 C521 thru C549 G521
	Sedan		C551 thru C558 C562 thru C564 G551 and G552	C559 thru C560 C565 thru C590
Hatch Wire Harness (Hatchback)				C601 thru C607 G601
Trunk Wire Harness (Sedan)				C621 thru C636 G621
Fuel Tank Sub-harness				C651 and C652 T651 and T652
ABS Rear Speed Sensor Sub-harness				C661 thru C663
License Plate Light Sub-harness				C671 thru C675
Dashboard Wire Harness			C701 thru C724 and C728 G701	C725 thru C727
Roof Wire Harness			C801 thru C804	C805 thru C807
Defogger Ground Wire				C821 G821
Driver's Door Wire Harness				C841 thru C850
Right Front Door Wire Harness				C861 thru C869
Left Rear Door Wire Harness (Sedan)				C881 thru C884
Right Rear Door Wire Harness (Sedan)				C891 thru C894
Under-hood Main Fuse Box		C901 thru C904		
Under-dash Fuse/Relay Box			C911 thru C928	

# Connector Identification and Wire Harness Routing

## Starter Cable

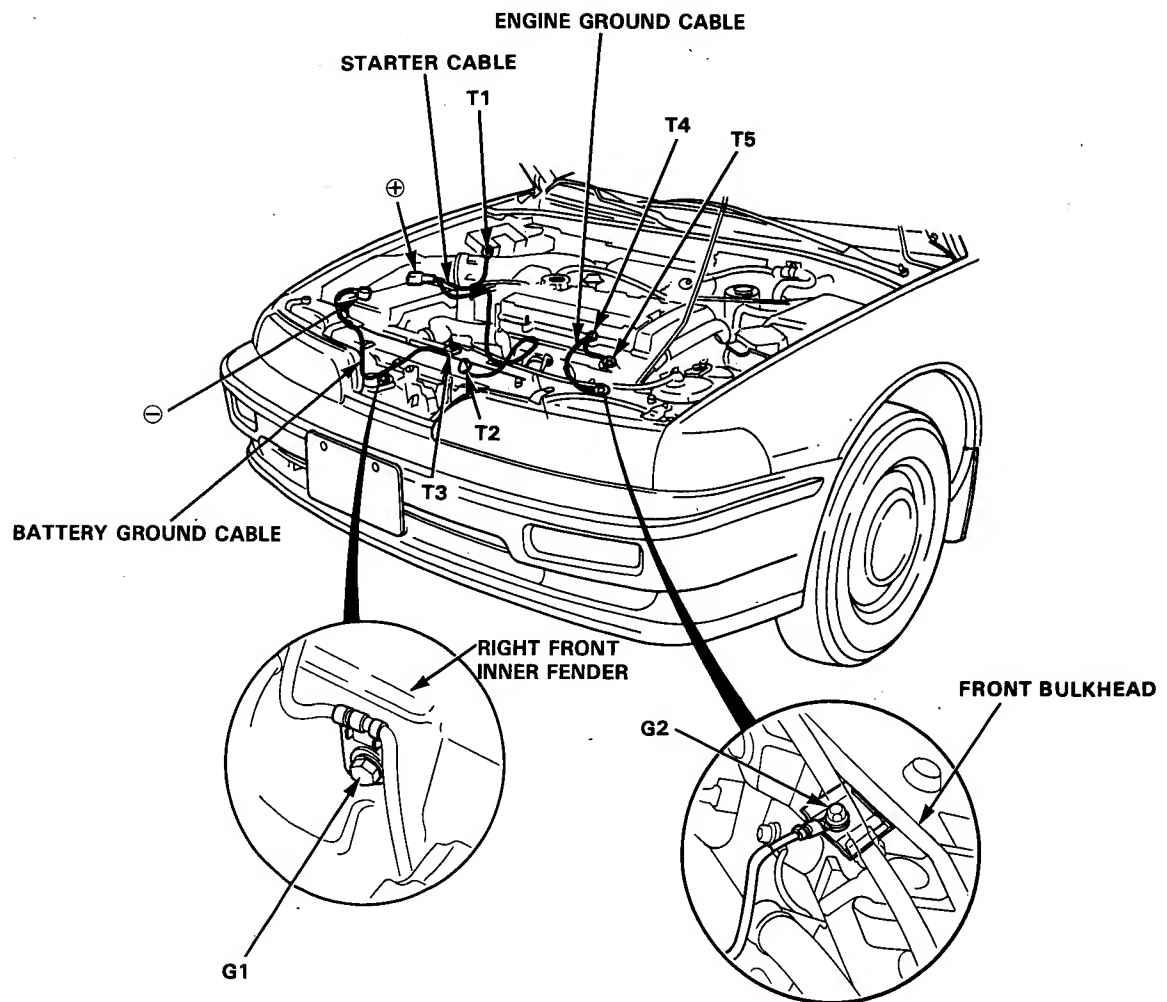
Connector or Terminal	Number of Cavities	Location	Connects to	Notes
T1		Right side of engine compartment	Under-hood main fuse box	
T2		Middle of engine compartment	Starter motor	
⊕		Battery	Battery positive terminal	

## Battery Ground Cable

T3		Middle of engine compartment	Transmission	
G1		Right side of engine compartment	Body ground, via battery ground cable	
⊖		Battery	Battery negative terminal	

## Engine Ground Cable

T4		Middle of engine compartment	Cylinder head	
T5		Middle of engine compartment	Cylinder head	
G2		Left side of engine compartment	Body ground, via engine ground cable	

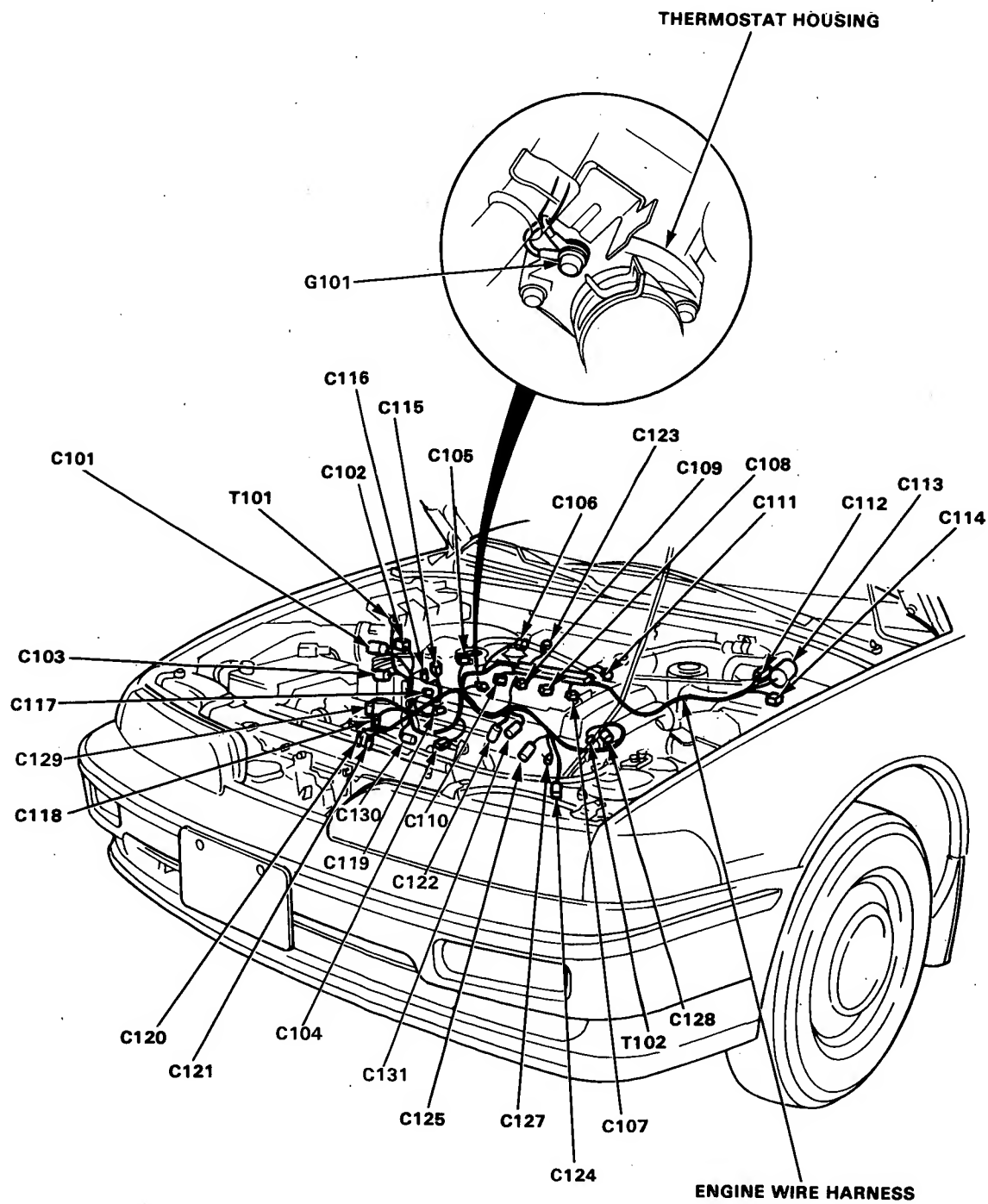


# Connector Identification and Wire Harness Routing

## Engine Wire Harness

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C101	14	Right side of engine compartment	Main-wire harness (C216)	
C102	8	Right side of engine compartment	Main wire harness (C217)	A/T
C103	2	Right side of engine compartment	Main wire harness (C218)	
C104	2	Right side of engine compartment	A/T speed pulser	A/T
C105	3	Right side of engine	EGR valve lift sensor	A/T
C106	3	Middle of engine	Throttle position (TP) sensor	
C107	2	Middle of engine	No. 1 Fuel injector	
C108	2	Middle of engine	No. 2 Fuel injector	
C109	2	Middle of engine	No. 3 Fuel injector	
C110	2	Middle of engine	No. 4 Fuel injector	
C111	2	Middle of engine	Intake air temperature (IAT) sensor	
C112	6	Left side of engine compartment	Main wire harness (C317)	RS, LS, GS
C113	14	Left side of engine compartment	Main wire harness (C318)	
C114	8	Left side of engine compartment	Junction connector	
C115	8	Right side of engine	TDC/CKP/CYP sensor	
C116	2	Right side of engine	Ignition coil	
C117	2	Right side of engine	Engine coolant temperature (ECT) sensor	
C118	1	Right side of engine compartment	Starter solenoid	
C119	1	Right side of engine	ECT sending unit	
C120	1	Right side of engine compartment	Back-up light switch (IN)	M/T
C120	2	Right side of engine compartment	Shift control solenoid valve	A/T
C121	1	Right side of engine compartment	Back-up light switch (OUT)	M/T
C121	4	Right side of engine compartment	Lock-up control solenoid valve	A/T
C122	4	Right side of engine compartment	Heated oxygen sensor (HO2S)	
C123	2	Right side of engine compartment	Intake air control (IAC) valve	
C124	2	Right side of engine compartment	Engine oil temperature switch	(USA)
C125	2	Middle of engine	ECT switch	
C127	1	Middle of engine	Engine oil pressure switch	
C128	4	Left side of engine compartment	Voltage regulator	
C129	1	Right side of engine	VTEC valve	GSR
C130	2	Right side of engine	VTEC pressure switch	GSR
C131	2	Middle of engine	Knock sensor (KS)	GSR
T101		Right side of engine compartment	Under-hood main fuse box	
T102		Left side of engine compartment	Alternator	
G101		Middle of engine	Engine ground, via engine wire harness	



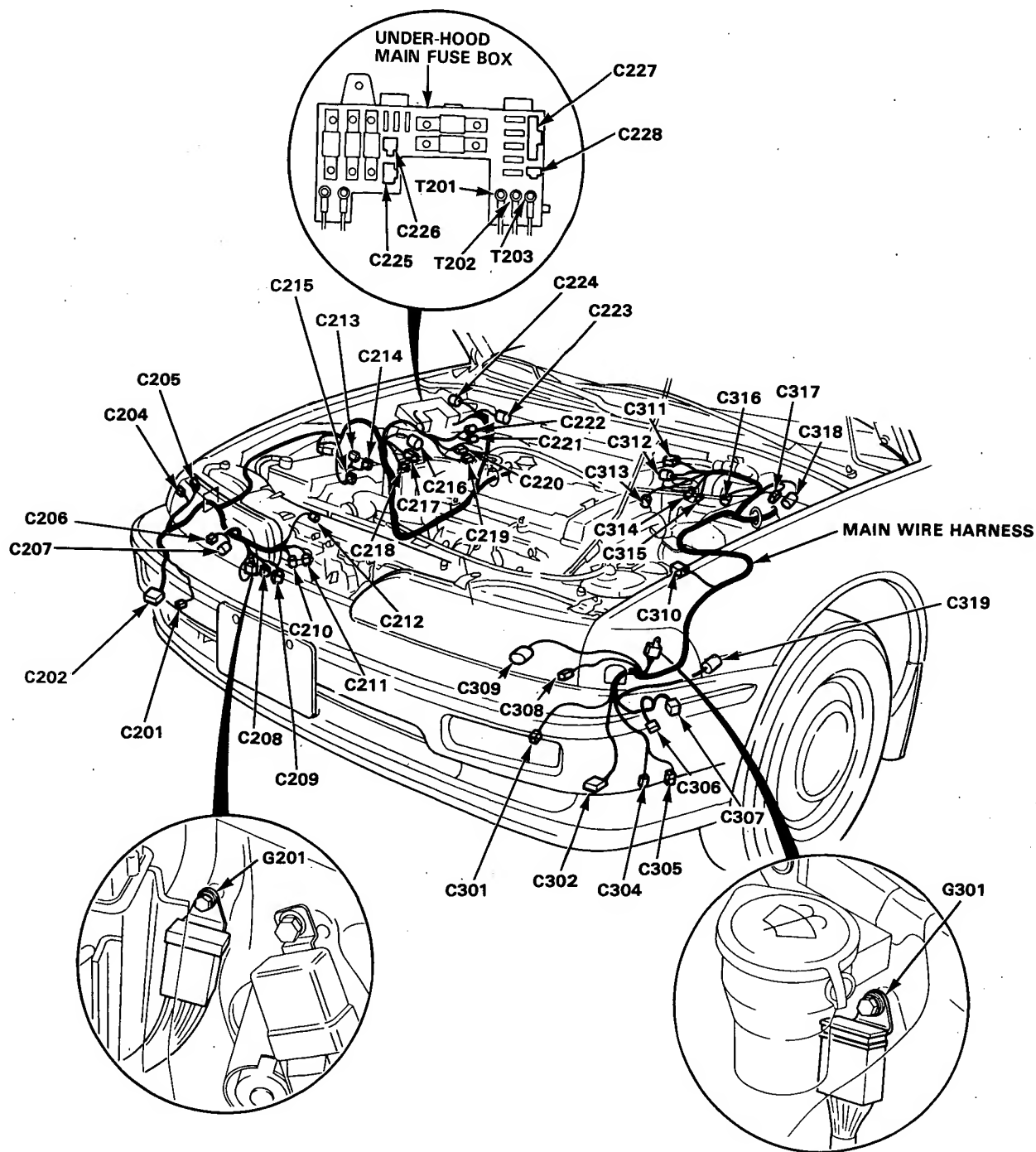


## Connector Identification and Wire Harness Routing

## Main Wire Harness

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C201	2	Behind right side of front bumper	Right front turn signal light	
C202	2	Behind right side of front bumper	Right horn	
C204	2	Right side of engine compartment	Right front parking light	
C205	2	Right side of engine compartment	Right front side marker light	
C206	2	Right side of engine compartment	Right front fog light	
C207	3	Right side of engine compartment	Right headlight	
C208	6	Right side of engine compartment	A/C wire harness (C290)	
C209	2	Right side of engine compartment	A/C wire harness (C289)	
C210	2	Right side of engine compartment	ABS pressure switch	GS, GSR
C211	2	Right side of engine compartment	ABS motor	GS, GSR
C212	2	Right side of engine compartment	Radiator fan motor	Without A/C
C212	2	Right side of engine compartment	A/C wire harness (C288)	With A/C
C213	4	Right side of engine compartment	ABS motor relay	*
C214	4	Right side of engine compartment	ABS front fail-safe relay	*
C215	4	Right side of engine compartment	ABS rear fail-safe relay	*
C216	14	Right side of engine compartment	Engine wire harness (C101)	
C217	8	Right side of engine compartment	Engine wire harness (C102)	A/T
C218	2	Right side of engine compartment	Engine wire harness (C103)	
C219	3	Right side of engine compartment	ABS left front solenoid	*
C220	3	Right side of engine compartment	ABS right front solenoid	*
C221	3	Right side of engine compartment	ABS rear solenoid	*
C222	2	Right side of engine compartment	ABS right front speed sensor	*
C223	4	Right side of engine compartment	Emission control box	A/T
C224	5	Right side of engine compartment	Windshield wiper motor	
C225	3	Right side of engine compartment	Under-hood main fuse box (C901)	
C226	2	Right side of engine compartment	Under-hood main fuse box (C902)	
C227	4	Right side of engine compartment	Under-hood main fuse box (C903)	
C228	1	Right side of engine compartment	Under-hood main fuse box (C904)	
T201		Right side of engine compartment	Under-hood main fuse box	
T202		Right side of engine compartment	Under-hood main fuse box	
T203		Right side of engine compartment	Under-hood main fuse box	Option (+)
G201		Right side of engine compartment	Body ground, via main harness	
C301	2	Behind Left side of front bumper	Left front turn signal light	
C302	2	Behind Left side of front bumper	Left horn	
C304	2	Behind Left side of front bumper	Windshield washer motor	
C305	2	Behind Left side of front bumper	Rear window washer motor	Hatchback
C306	2	Left side of engine compartment	Left front parking light	
C307	2	Left side of engine compartment	Left front side marker light	
C308	2	Left side of engine compartment	Left front fog light	
C309	3	Left side of engine compartment	Left headlight	
C310	4	Left side of engine compartment	Cruise control actuator	
C311	4	Left side of engine compartment	Emission control solenoid valves	RS, LS, GS
C311	2	Left side of engine compartment	Emission control solenoid valve	GSR
C312	3	Left side of engine compartment	MAP sensor	
C313	2	Left side of engine compartment	Power steering pressure (PSP) switch	
C314	1	Left side of engine compartment	Brake fluid level switch (+)	
C315	1	Left side of engine compartment	Brake fluid level switch (-)	
C316	2	Left side of engine compartment	ABS left front speed sensor	*
C317	6	Left side of engine compartment	Engine wire harness (C112)	
C318	14	Left side of engine compartment	Engine wire harness (C113)	
C319	3	Left side of engine compartment	Daytime running lights resistor	(Canada)
G301		Left side of engine compartment	Body ground, via main harness	

\*: USA (GS, GSR), Canada (LS, GS, GSR).

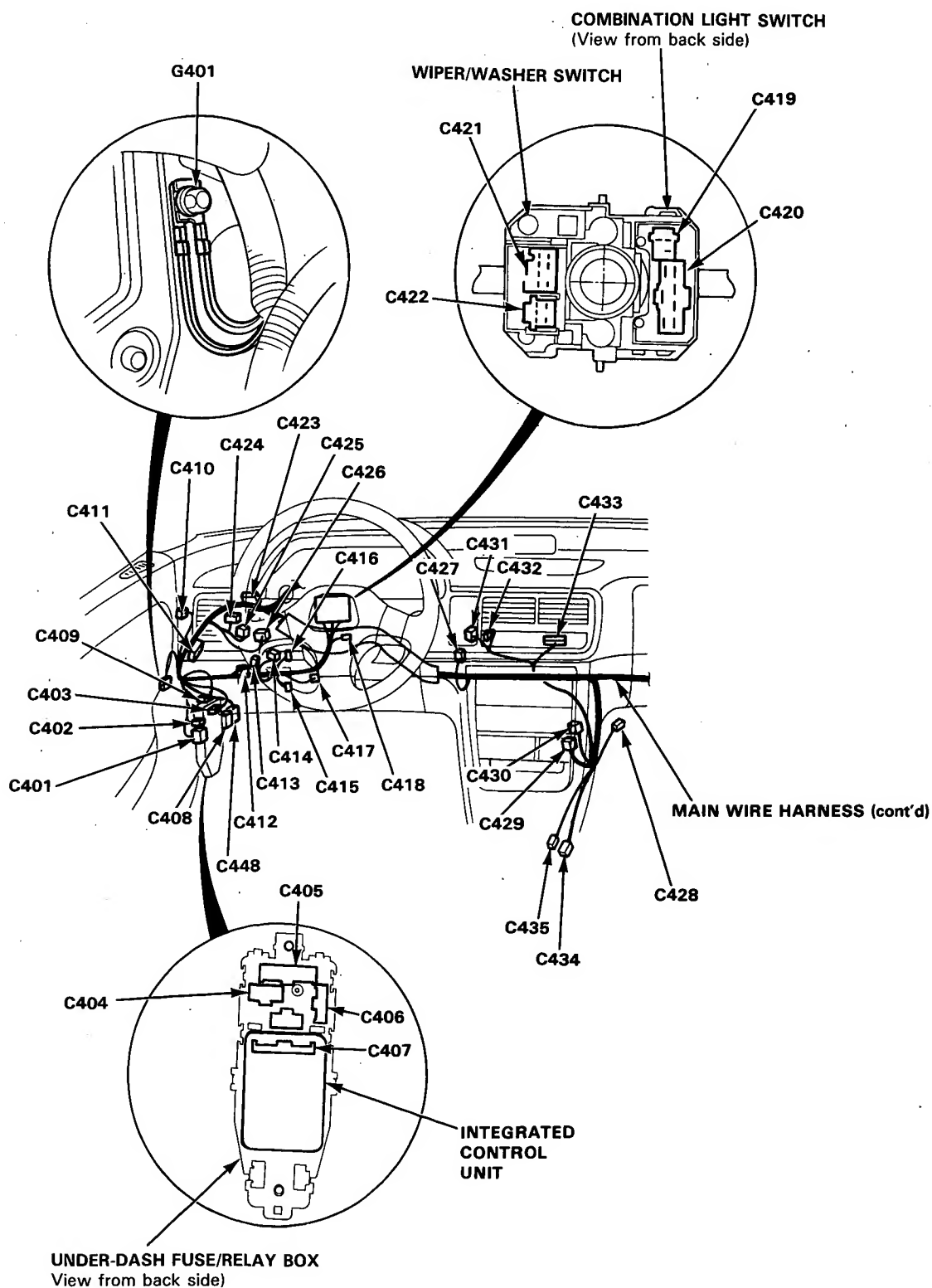


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# Connector Identification and Wire Harness Routing

## Main Wire Harness (cont'd)

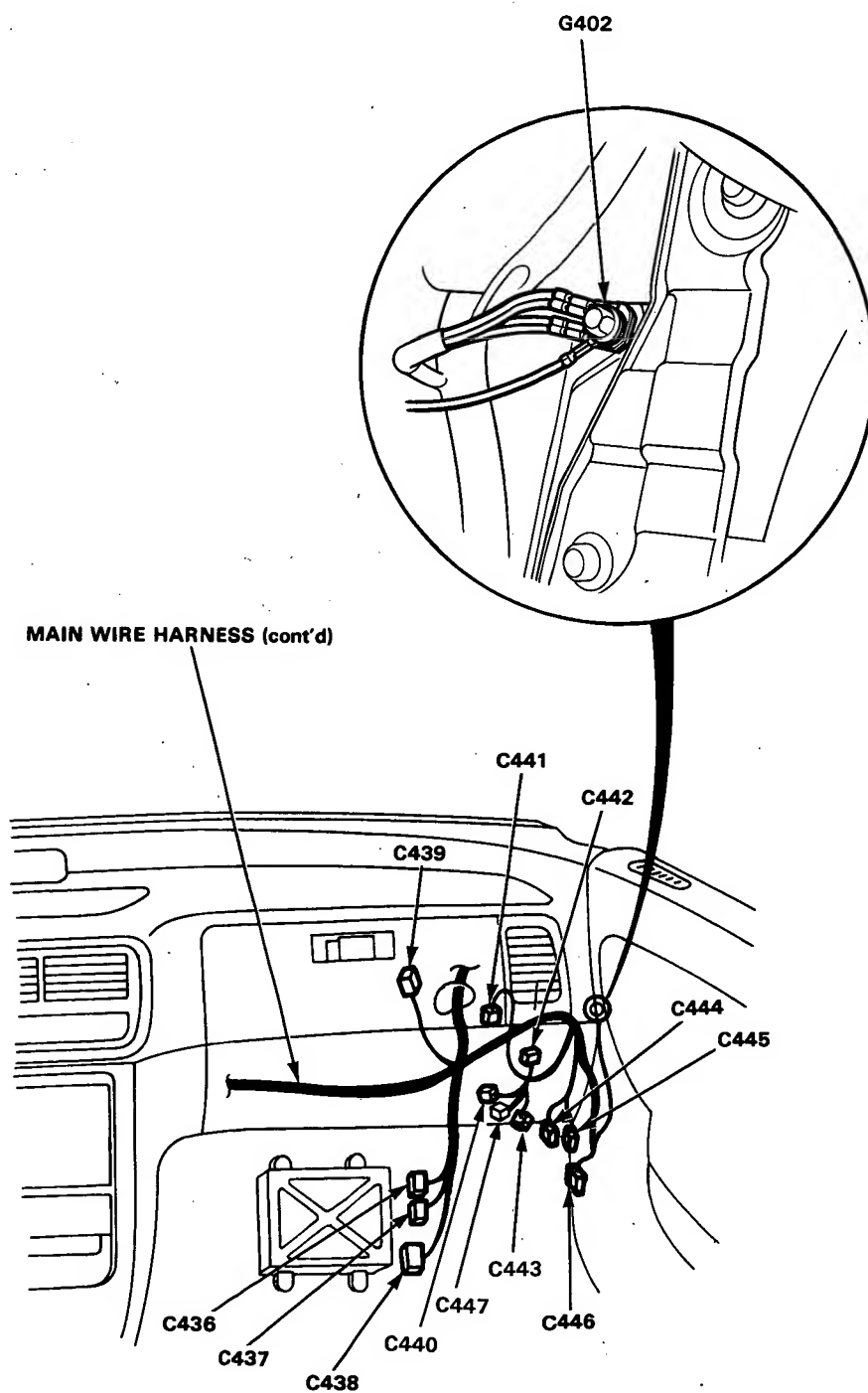
Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C401	24	Behind left kick panel	Dashboard wire harness (C701)	A/T
C401	16	Behind left kick panel	Dashboard wire harness (C701)	M/T
C402	4	Behind left kick panel	Dashboard wire harness (C702)	
C403	1	Behind left kick panel	Under-dash fuse/relay box (C913)	
C404	6	Behind left kick panel	Under-dash fuse/relay box (C922)	
C405	22	Behind left kick panel	Under-dash fuse/relay box (C923)	
C406	3	Behind left kick panel	Under-dash fuse/relay box (C924)	
C407	12	Behind left kick panel	Integrated control unit	
C408	13	Behind left kick panel	Rear wire harness (Hatchback: C501, Sedan: C551)	
C448	2	Behind left kick panel	Rear wire harness (Hatchback: C517, Sedan: C568)	
C409	4	Behind left kick panel	Front fog light relay	
C410	2	Under left side of dash	Roof wire harness (C801)	
C411	20	Under left side of dash	Junction connector	
C412	5	Under left side of dash	Ignition switch	
C413	3	Under left side of dash	Turn signal/Hazard relay	
C414	8	Under left side of dash	PGM-FI main relay	
C415	2	Under left side of dash	Clutch switch	M/T
C416	2	Under left side of dash	Clutch interlock switch	M/T
C417	2	Under left side of dash	Brake switch	RS
C417	4	Under left side of dash	Brake switch	LS, GS, GSR
C418	3	Under left side of dash	Cruise control slip ring	LS, GS, GSR
C419	4	Under left side of dash	Turn signal switch	
C420	7	Under left side of dash	Combination light switch	
C421	8	Under left side of dash	Windshield wiper switch	
C422	6	Under left side of dash	Rear wiper switch	Hatchback
C423	20	Under left side of dash	Junction connector	
C424	18	Under left side of dash	Transmission control module (TCM)	A/T
C425	12	Under left side of dash	TCM	A/T
C426	14	Under left side of dash	Cruise control unit	LS, GS, GSR
C427	8	Under middle of dash	Heater mode control motor	LS, GS, GSR
C428	2	Under middle of dash	A/C thermo switch	
C429	4	Under middle of dash	Starter relay	M/T
C430	8	Under middle of dash	Radiator fan control module	(USA)
C431	6	Under middle of dash	Heater control panel (Fan switch)	
C432	6	Under middle of dash	Heater control panel (A/C switch)	
C433	14	Under middle of dash	Heater control panel (Mode switch)	LS, GS, GSR
C433	2	Under middle of dash	Heater control panel (Light)	RS
C434	2	Under middle of floor	S4 switch	A/T
C435	2	Under middle of floor	Neutral position switch	A/T
G401		Behind left kick panel	Body ground, via main harness	



# Connector Identification and Wire Harness Routing

## Main Wire Harness (cont'd)

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C436 C437 C438	22 16 26	Right side of floor Right side of floor Right side of floor	ECM ECM ECM	
C439 C440 C441 C442 C443 C447	4 2 4 3 2 3	Under right side of dash Under right side of dash Under right side of dash Under right side of dash Under right side of dash Under right side of dash	Recirculation control motor Blower motor Blower motor resistor A/C diode Service check connector Data link connector (DLC)	LS, GS, GSR
C444 C445 C446  C446	8 4 24  6	Behind right kick panel Behind right kick panel Behind right kick panel  Behind right kick panel	Daytime running lights relay Daytime running lights relay Rear wire harness (Hatchback: C510, Sedan: C562) Rear wire harness (Hatchback: C510, Sedan: C562)	(Canada) (Canada) With ABS  (USA): Without ABS
G402		Behind right kick panel	Body ground, via main harness	



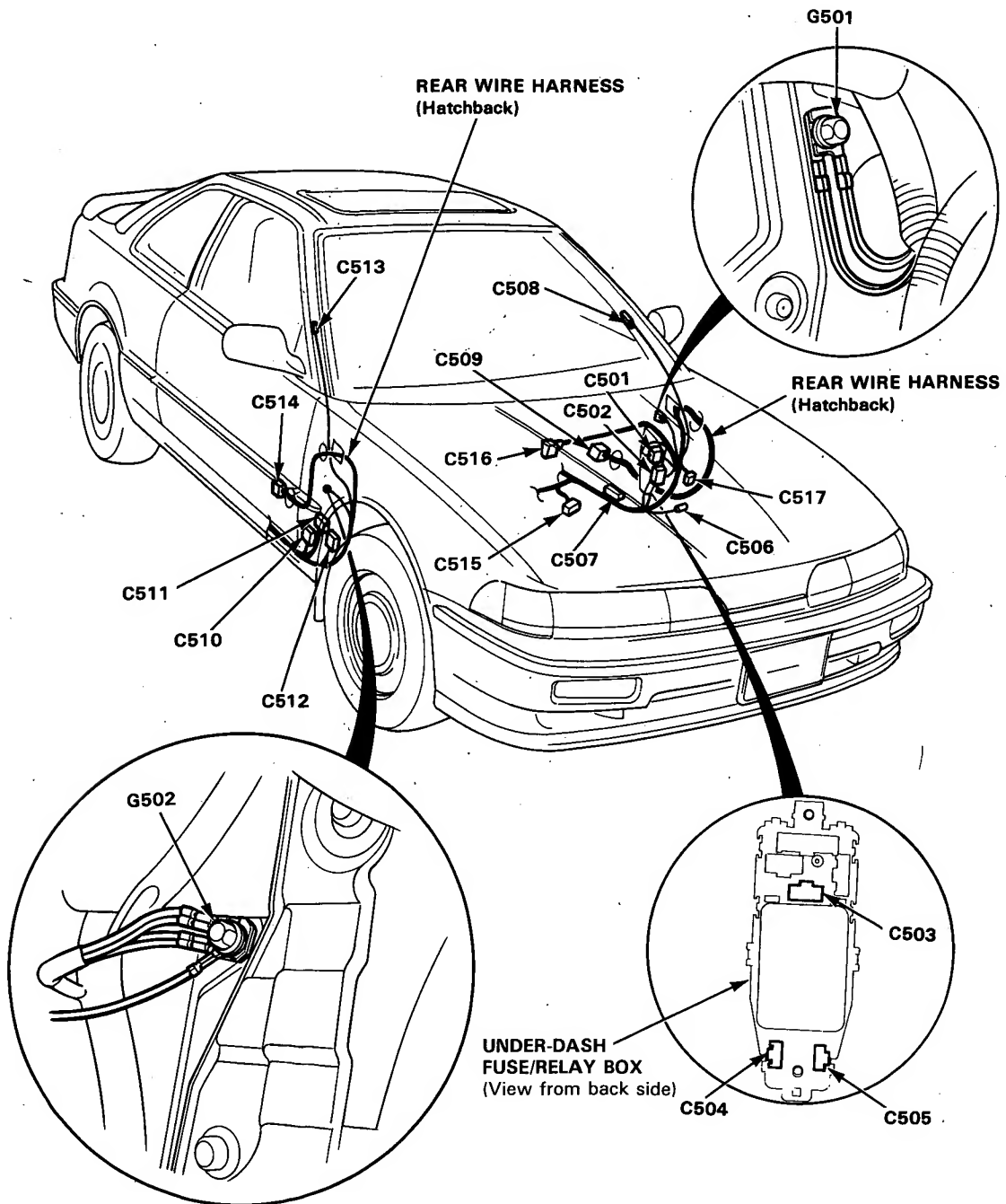
# Connector Identification and Wire Harness Routing

## Rear Wire Harness (Hatchback)

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C501	13	Behind left kick panel	Main wire harness (C408)	(Canada) LS, GS, GSR (USA) * *
C502	23	Behind left kick panel	Dashboard wire harness (C705)	
C503	8	Behind left kick panel	Under-dash fuse/relay box (C925)	
C504	5	Behind left kick panel	Under-dash fuse/relay box (C927)	
C505	2	Behind left kick panel	Under-dash fuse/relay box (C928)	
C506	1	Behind left kick panel	Condenser	
C507	20	Behind left kick panel	Junction connector	
C508	2	Left A pillar area	Front position switch (For driver's shoulder seat belt buckle)	
C515	4	Behind left kick panel	Junction connector	
C516	14	Under left side of dash	Power door lock control unit	
C517	2	Under left side of dash	Main wire harness (C448)	
C509	6	Driver's door area	Driver's door wire harness (C841)	RS
C509	27	Driver's door area	Driver's door wire harness (C841)	*
C510	24	Behind right kick panel	Main wire harness (C446)	With ABS (USA): Without ABS (USA) (USA) (USA)
C510	6	Behind right kick panel	Main wire harness (C446)	
C511	7	Behind right kick panel	Automatic shoulder seat belt control unit	
C512	22	Behind right kick panel	Automatic shoulder seat belt control unit	
C513	2	Right A pillar area	Front position switch (For front passenger's shoulder seat belt buckle)	(USA)
C514	6	Right door area	Right door wire harness (C861)	RS
C514	27	Right door area	Right door wire harness (C861)	*4
G501		Behind left kick panel	Body ground, via rear harness	
G502		Behind right kick panel	Body ground, via rear harness	

\*: USA (GS, GSR), Canada (LS, GS, GSR)



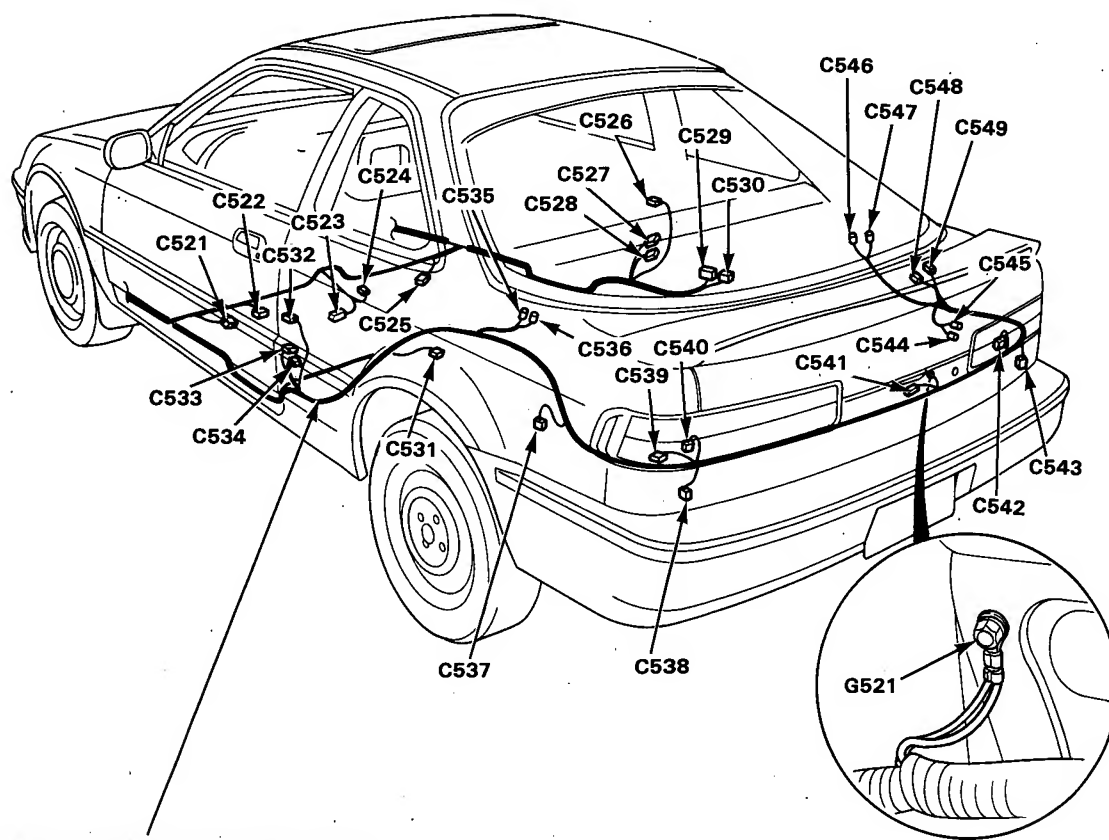


# Connector Identification and Wire Harness Routing

## Rear Wire Harness: Hatchback (cont'd)

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C521	6	Left side of floor	Driver's shoulder seat belt retractor	(USA)
C522	6	Left side of floor	ABS inspection connector	*
C523	2	Left side of floor	Driver's seat belt switch	(Canada)
C524	1	Middle of floor	Parking brake switch	
C525	4	Right side of floor	Front passenger's shoulder seat belt retractor	(USA)
C526	1	Right B pillar area	Right door switch	
C527	2	Behind right quarter trim panel	Front passenger's shoulder seat belt buckle motor	(USA)
C528	4	Behind right quarter trim panel	Front passenger's rear lock position switch (For front passenger's shoulder seat belt buckle)	(USA)
C529	18	Behind right quarter trim panel	ABS control unit	*
C530	12	Behind right quarter trim panel	ABS control unit	*
C531	6	Under middle of rear seat	Fuel tank sub-harness (C651)	
C532	1	Left middle of pillar	Driver's door switch	(USA)
C533	2	Behind left quarter trim panel	Driver's shoulder seat belt buckle motor	
C534	4	Behind left quarter trim panel	Driver's rear lock position switch (For driver's shoulder seat belt buckle)	(USA)
C535	1	Left side of trunk	Left rear speaker (+)	
C536	1	Left side of trunk	Left rear speaker (-)	
C537	4	Left side of trunk	Power antenna motor	
C538	6	Left rear corner of trunk	ABS rear speed sensor sub-harness (C661)	*
C539	8	Left rear corner of trunk	(For connection to trailer lighting)	
C540	6	Left rear corner of trunk	Left taillight assembly	
C541	2	Center trunk area	Trunk latch switch	
C542	6	Right rear trunk area	Right taillight assembly	
C543	2	Right rear trunk area	License plate light sub-harness (C671)	
C544	1	Right side of trunk	Trunk light (+)	
C545	1	Right side of trunk	Trunk light (-)	
C546	1	Right side of trunk	Right rear speaker (+)	
C547	1	Right side of trunk	Right rear speaker (-)	
C548	4	Right side of trunk	Hatch wire harness (C601)	
C549	2	Right side of trunk	Hatch wire harness (C602)	
G521		Middle of rear trunk panel	Body ground, via rear harness	

\*: USA (GS, GSR), Canada (LS, GS, GSR)



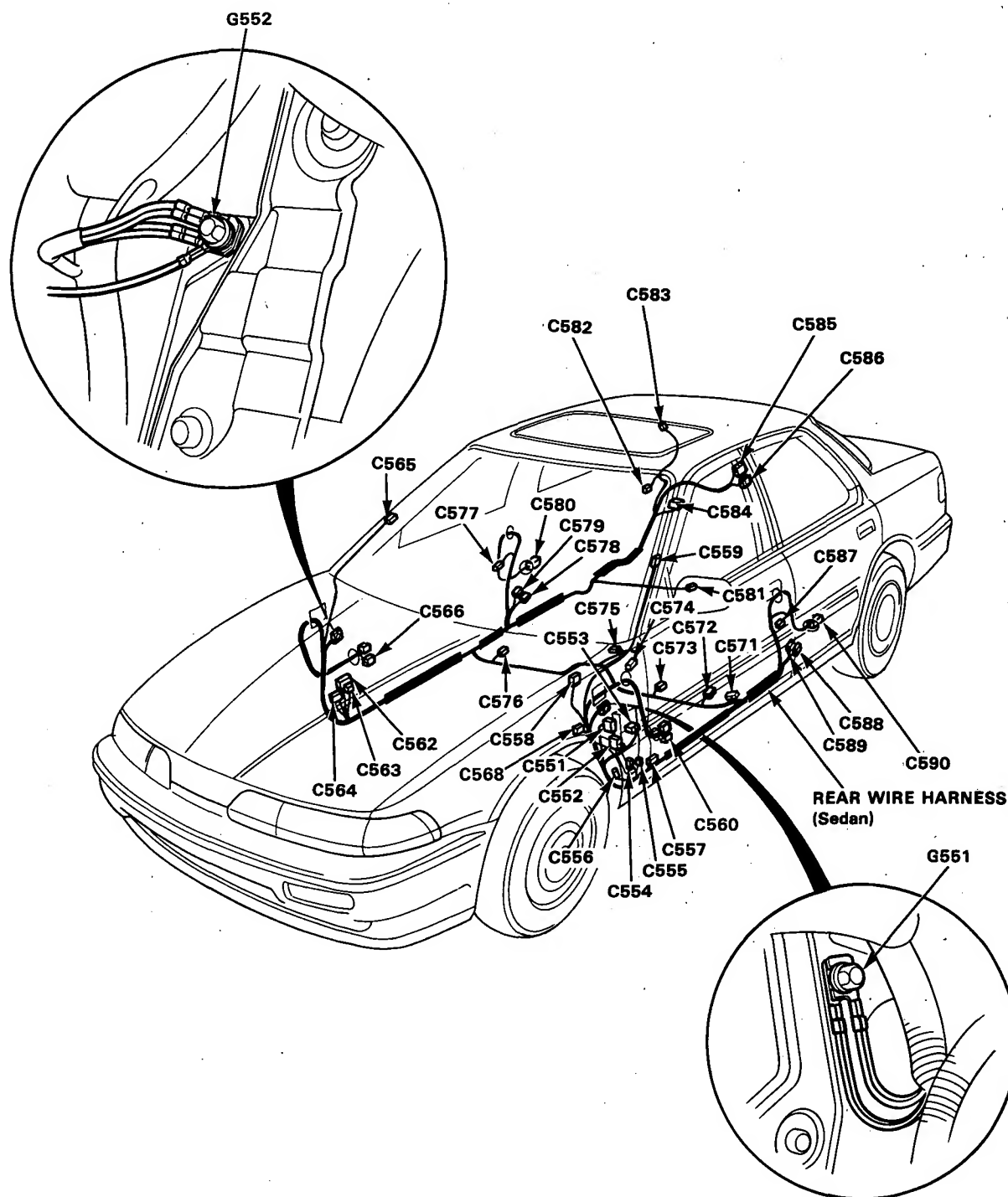
REAR WIRE HARNESS: Hatchback (cont'd)

# Connector Identification and Wire Harness Routing

## Rear Wire Harness (Sedan)

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C551	13	Behind left kick panel	Main wire harness (C408)	
C568	2	Behind left kick panel	Main wire harness (C448)	
C552	23	Behind left kick panel	Dashboard wire harness (C705)	
C553	8	Behind left kick panel	Under-dash fuse/relay box (C925)	
C554	5	Behind left kick panel	Under-dash fuse/relay box (C927)	
C555	2	Behind left kick panel	Under-dash fuse/relay box (C928)	
C556	1	Behind left kick panel	Condenser	
C557	20	Behind left kick panel	Junction connector	LS, GS
C558	14	Under left side of dash	Power door lock control unit	LS, GS
C559	2	Left A pillar	Front position switch (For front driver's shoulder seat belt buckle)	(USA)
C560	6	Driver's door area	Driver's door wire harness (C841)	RS
C560	27	Driver's door area	Driver's door wire harness (C841)	LS, GS
C562	24	Behind right kick panel	Main wire harness (C446)	With ABS
C562	6	Behind right kick panel	Main wire harness (C446)	(USA):
C563	7	Behind right kick panel	Automatic shoulder seat belt control unit	Without ABS
C564	22	Behind right kick panel	Automatic shoulder seat belt control unit	(USA)
C565	2	Right A pillar area	Front position switch (For front passenger's shoulder belt buckle)	(USA)
C566	6	Right front door area	Right front door wire harness (C861)	RS
C566	27	Right front door area	Right front door wire harness (C861)	LS, GS
C571	20	Left side of floor	Junction connector	
C571	4	Left side of floor	Junction connector	(USA): RS
C572	6	Left side of floor	Driver's shoulder seat belt retractor	(USA)
C573	6	Left side of floor	ABS inspection connector	*2
C574	2	Left side of floor	Driver's seat belt switch	(Canada)
C575	1	Middle of floor	Parking brake switch	
C576	4	Right side of floor	Front passenger's shoulder seat belt retractor	(USA)
C577	1	Right B pillar area	Right front door switch	
C578	2	Right B pillar area	Front passenger's shoulder seat belt buckle motor	(USA)
C579	4	Right B pillar area	Front passenger's rear lock position switch	(USA)
			(For front passenger's shoulder seat belt buckle)	
C580	6	Right rear door area	Right rear door wires (C891)	LS, GS
C581	6	Under middle of rear seat	Fuel tank sub-harness (C651)	
C582	1	Right quarter panel	Right rear door switch	
C583	1	Rear window area	Rear window defogger	
C584	20	Right front corner of trunk	Trunk wire harness (C621)	
C585	18	Right side of trunk	ABS control unit	*2
C586	12	Right side of trunk	ABS control unit	*2
C587	1	Left B pillar area	Left front door switch	
C588	2	Left B pillar area	Driver's shoulder seat belt buckle motor	(USA)
C589	4	Left B pillar area	Driver's rear lock position switch	(USA)
			(For driver's shoulder seat belt buckle)	
C590	6	Left rear door area	Left rear door wire harness (C881)	LS, GS
G551		Behind left kick panel	Body ground, via rear harness	
G552		Behind right kick panel	Body ground, via rear harness	

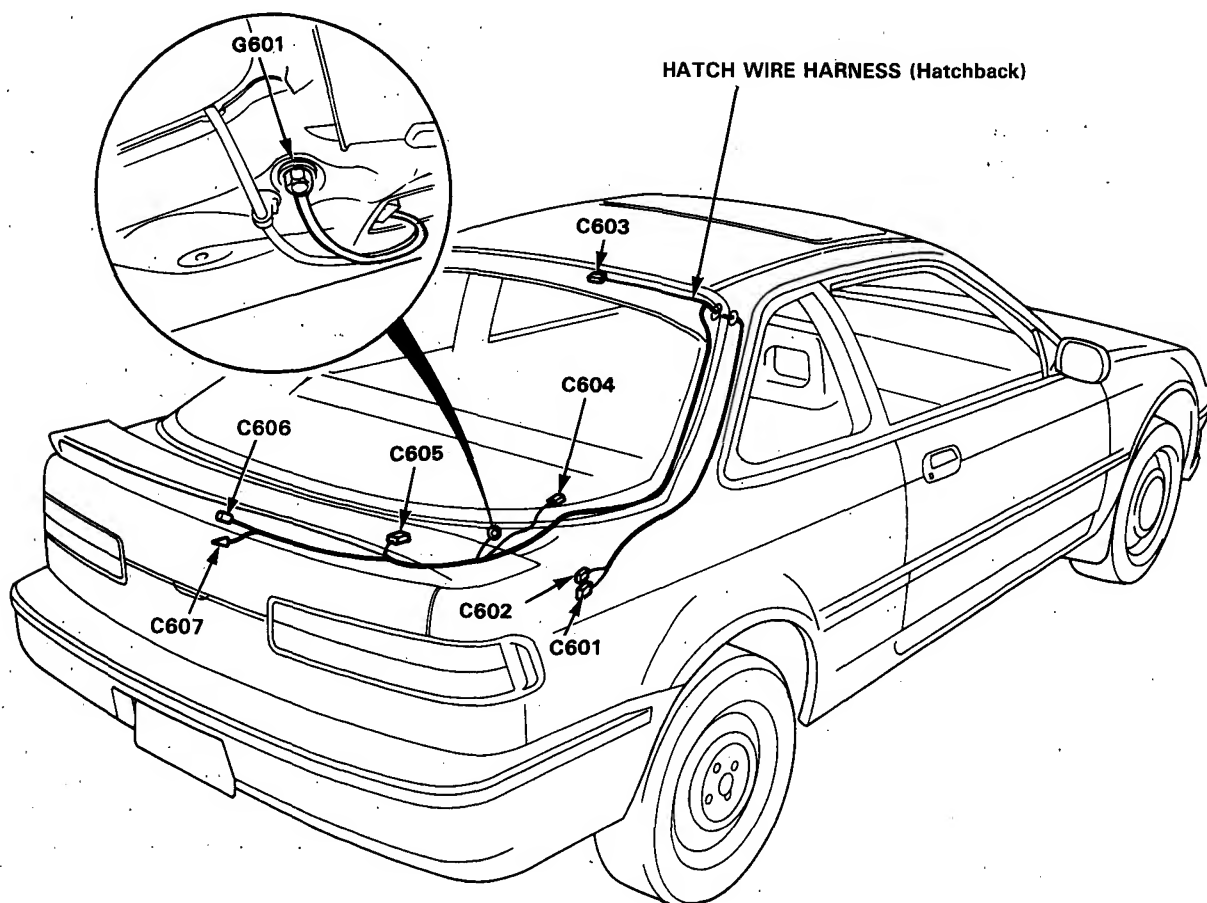
\*2: USA (GS), Canada (LS, GS)



# Connector Identification and Wire Harness Routing

## Hatch Wire Harness (Hatchback)

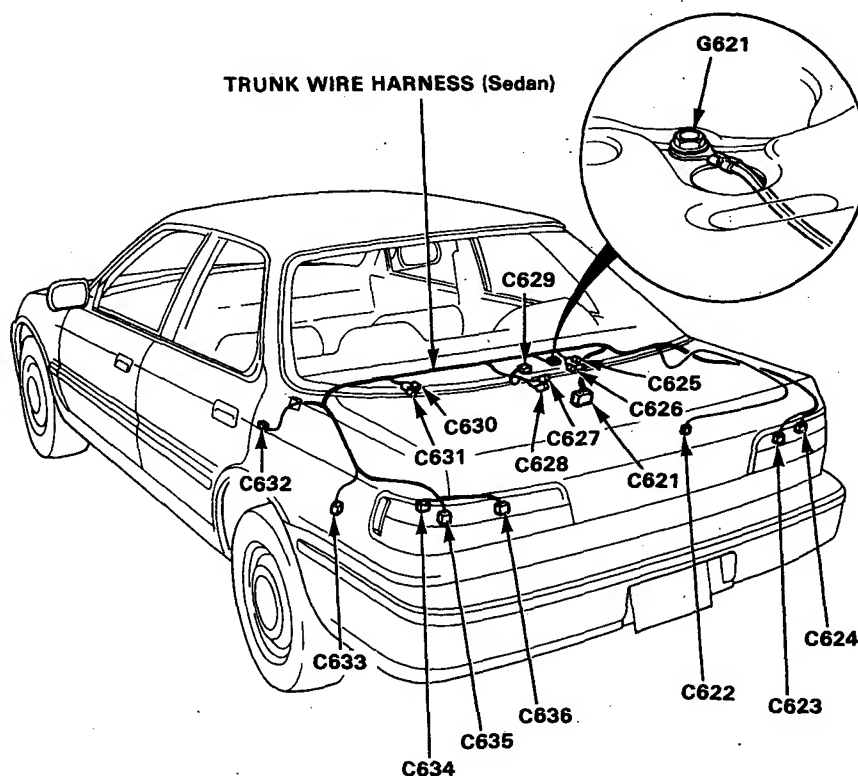
Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C601	4	Right side of trunk	Rear wire harness (C548)	
C602	2	Right side of trunk	Rear wire harness (C549)	
C603	2	Right side of hatch	High mount brake light	RS, LS, GS
C604	1	Right side of hatch	Rear window defogger	
C605	4	Right side of hatch	Rear window wiper motor	GSR GSR
C606	1	Right side of hatch	High mount brake light (+)	
C607	1	Right side of hatch	High mount brake light (-)	
G601		Right side of hatch	Body ground, via hatch wire harness	





# Trunk Wire Harness (Sedan)

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C621	20	Right front trunk area	Rear wire harness (C584)	
C622	2	Inside rear of trunk lid	Trunk latch switch	
C623	6	Right rear corner of trunk	Right taillight assembly	
C624	2	Right rear corner of trunk	License plate light sub-harness (C671)	
C625	1	Above right trunk area	Right rear speaker (+)	
C626	1	Above right trunk area	Right rear speaker (-)	
C627	2	Above center trunk area	High mount brake light	
C628	1	Above center trunk area	Trunk light (+)	
C629	1	Above center trunk area	Trunk light (-)	
C630	1	Above left trunk area	Left rear speaker (+)	
C631	1	Above left trunk area	Left rear speaker (-)	
C632	1	Left quarter panel area	Left rear door switch	
C633	4	Left side of trunk	Power antenna motor	
C634	8	Left rear corner of trunk	(For connection to trailer lighting)	
C635	6	Left rear corner of trunk	ABS rear speed sensor sub-harness (C661)	
C636	6	Left rear corner of trunk	Left taillight assembly	
G621		On rear shelf	Body ground, via trunk harness	

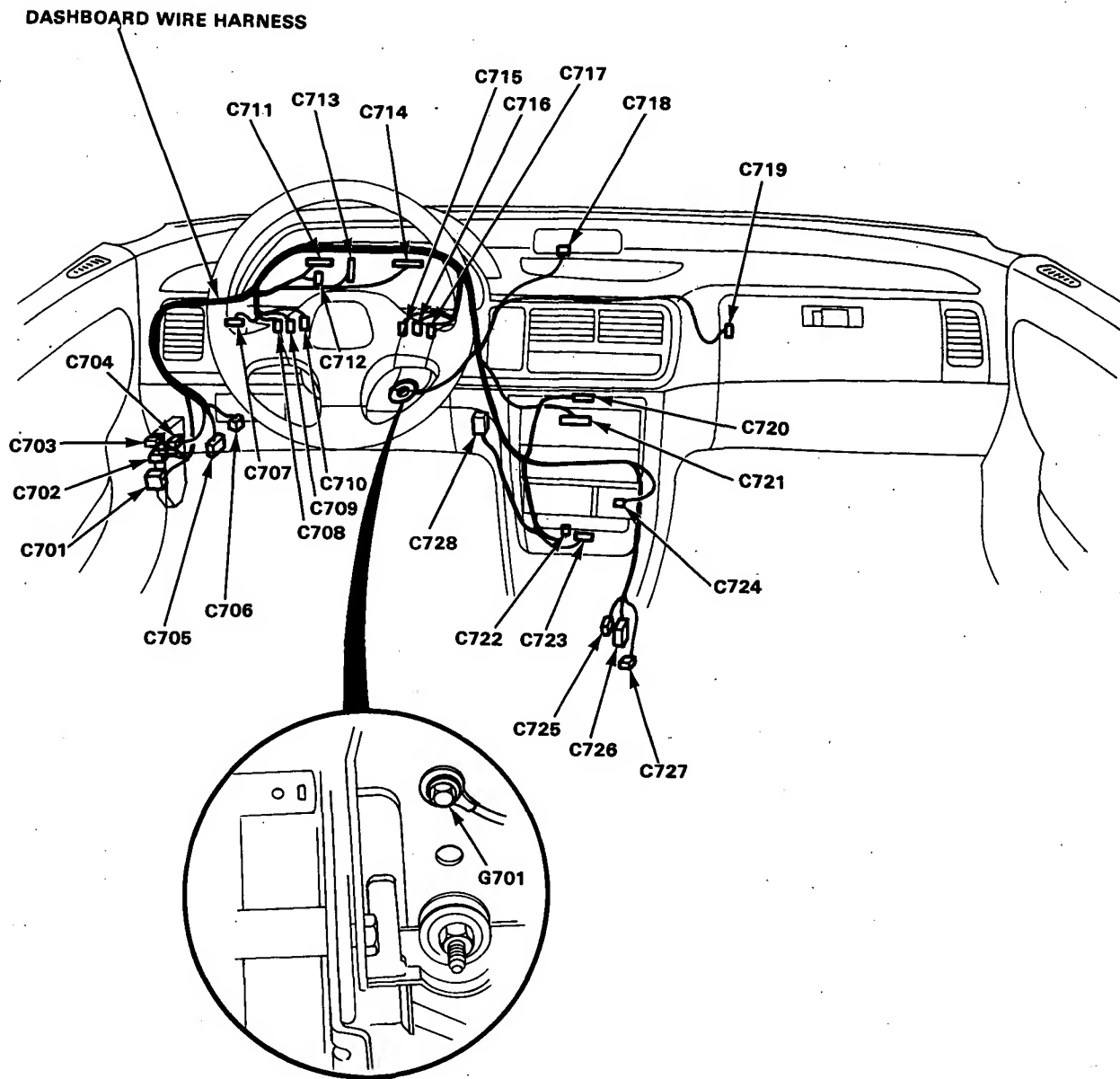


# Connector Identification and Wire Harness Routing

## Dashboard Wire Harness

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C701	24	Behind left kick panel	Main wire harness (C401)	A/T
C701	16	Behind left kick panel	Main wire harness (C401)	M/T
C702	4	Behind left kick panel	Main wire harness (C402)	
C703	4	Behind left kick panel	Roof wire harness (C804)	
C704	18	Behind left kick panel	Under-dash fuse/relay box (C915)	
C705	23	Behind left kick panel	Rear wire harness (Hatchback: C502, Sedan: C552)	
C706	4	Under left side of dash	Key interlock solenoid	A/T
C707	10	Behind instrument panel	Power mirror switch (With power mirror)	
C708	8	Behind instrument panel	Front fog light switch (Without moonroof)	
C708	4	Behind instrument panel	Moonroof switch (With moonroof)	
C709	6	Behind instrument panel	Cruise control main switch	LS, GS, GSR
C709	3	Behind instrument panel	Dash lights brightness controller	RS
C710	3	Behind instrument panel	Dash lights brightness controller	LS, GS, GSR
C711	12	Behind gauges	Gauge assembly	
C712	7	Behind gauges	Cruise control indicator	LS, GS, GSR
C713	14	Behind gauges	A/T gear position indicator	A/T
C714	10	Behind gauges	Gauge assembly	
C715	8	Behind instrument panel	Front fog light switch (With moonroof)	
C716	6	Behind instrument panel	Rear window defogger switch	
C717	10	Behind instrument panel	Hazard warning switch	
C718	4	Under middle of dash	Clock	
C719	2	Under right side of dash	Glove box light	LS, GS, GSR
C720	2	Under middle of dash	Radio panel light	
C721	16	Under middle of dash	Stereo radio/cassette player	
C722	2	Under middle of dash	Chime	
C723	8	Under middle of dash	Interlock control unit	A/T
C724	4	Under middle of dash	Cigarette lighter and ashtray light	
C728	4	Under middle of dash	Cigarette lighter relay	
C725	2	Middle of floor	A/T gear position console light	A/T
C726	10	Middle of floor	A/T gear position switch	A/T
C727	3	Middle of floor	Shift lock solenoid	A/T
G701		Under left side of dash	Body ground, via dashboard harness	





# Connector Identification and Wire Harness Routing

## Fuel Tank Sub-harness

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C651	6	Under middle of rear seat	Rear wire harness (C531)	Hatchback Sedan
C651	6	Under middle of rear seat	Rear wire harness (C581)	
C652	3	Fuel tank area	Fuel gauge sending unit	
T651		Fuel tank area	Fuel pump (+)	
T652		Fuel tank area	Fuel pump (-)	

## ABS Rear Speed Sensor Sub-harness

C661	6	Left rear corner of trunk	Rear wire harness (C538)	Hatchback Sedan
C661	6	Left rear corner of trunk	Trunk wire harness (C635)	
C662	4	Under left side of trunk floor	ABS left rear speed sensor	
C663	2	Under left side of trunk floor	ABS right rear speed sensor	

## License Plate Light Sub-harness

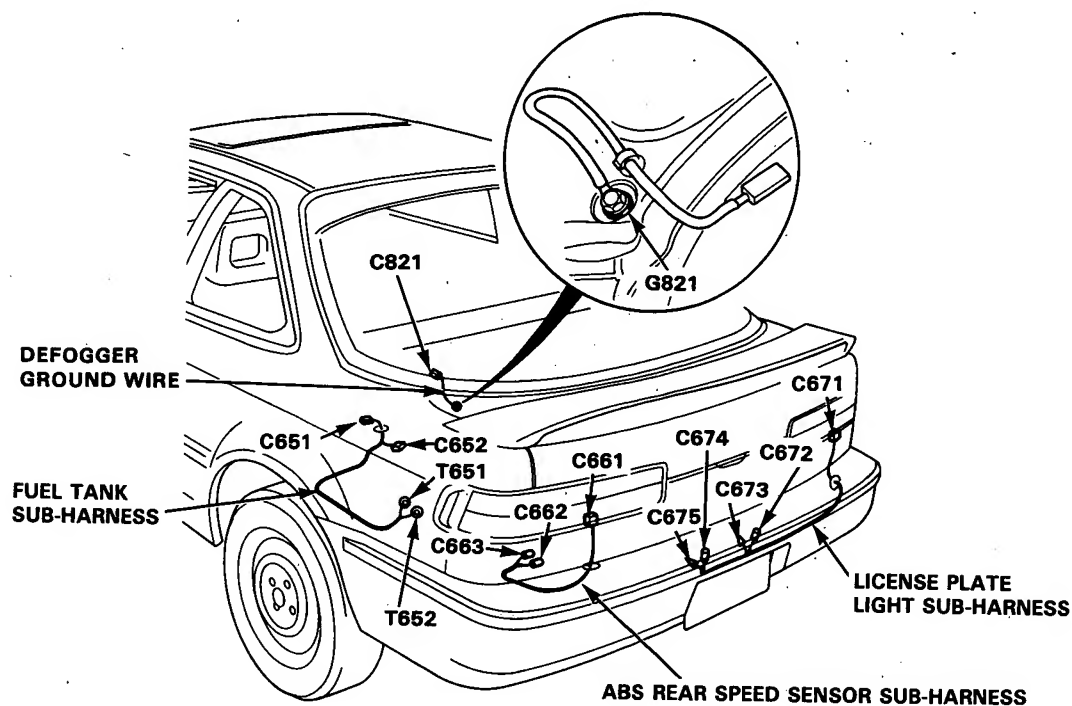
C671	2	Right rear corner of trunk	Rear wire harness (C543)	Hatchback Sedan
C671	2	Right rear corner of trunk	Trunk wire harness (C624)	
C672	1	Behind rear bumper	Right license plate light (+)	
C673	1	Behind rear bumper	Right license plate light (-)	
C674	1	Behind rear bumper	Left license plate light (+)	
C675	1	Behind rear bumper	Left license plate light (-)	

## Defogger Ground Wire

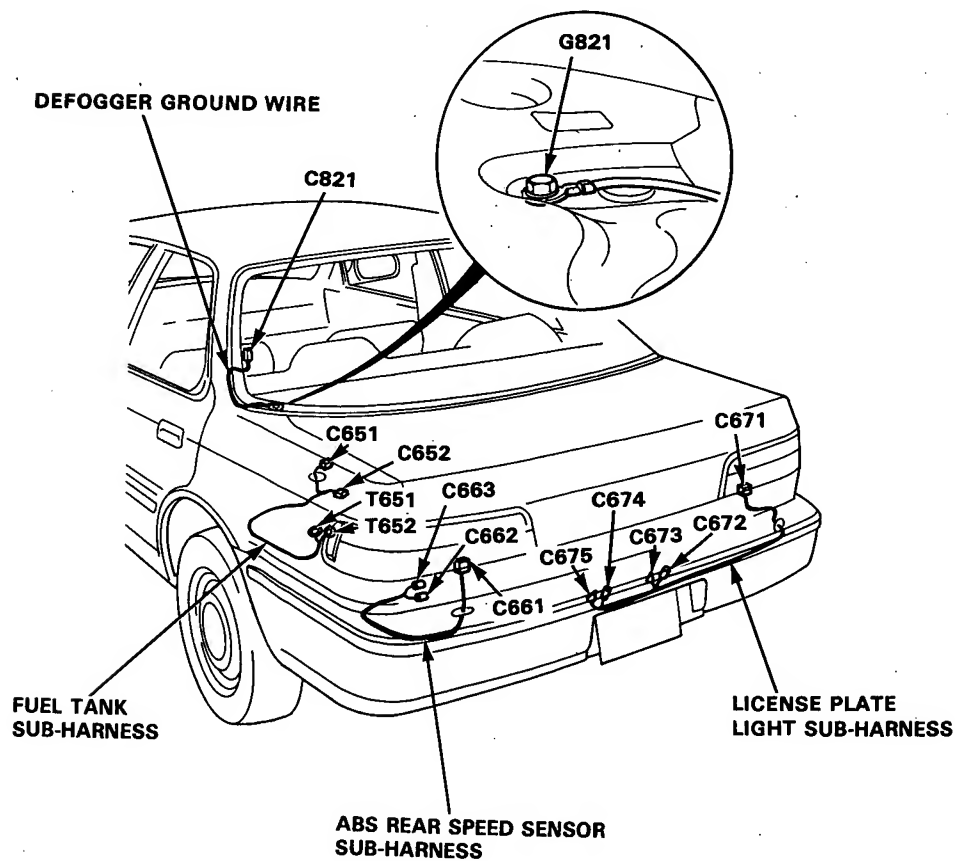
C821	1	Rear window area	Rear window defogger	
G821		Left side of hatch area	Body ground, via defogger ground wire	Hatchback Sedan
G821		On rear shelf	Body ground, via defogger ground wire	



**Hatchback:**



**Sedan:**



# Connector Identification and Wire Harness Routing

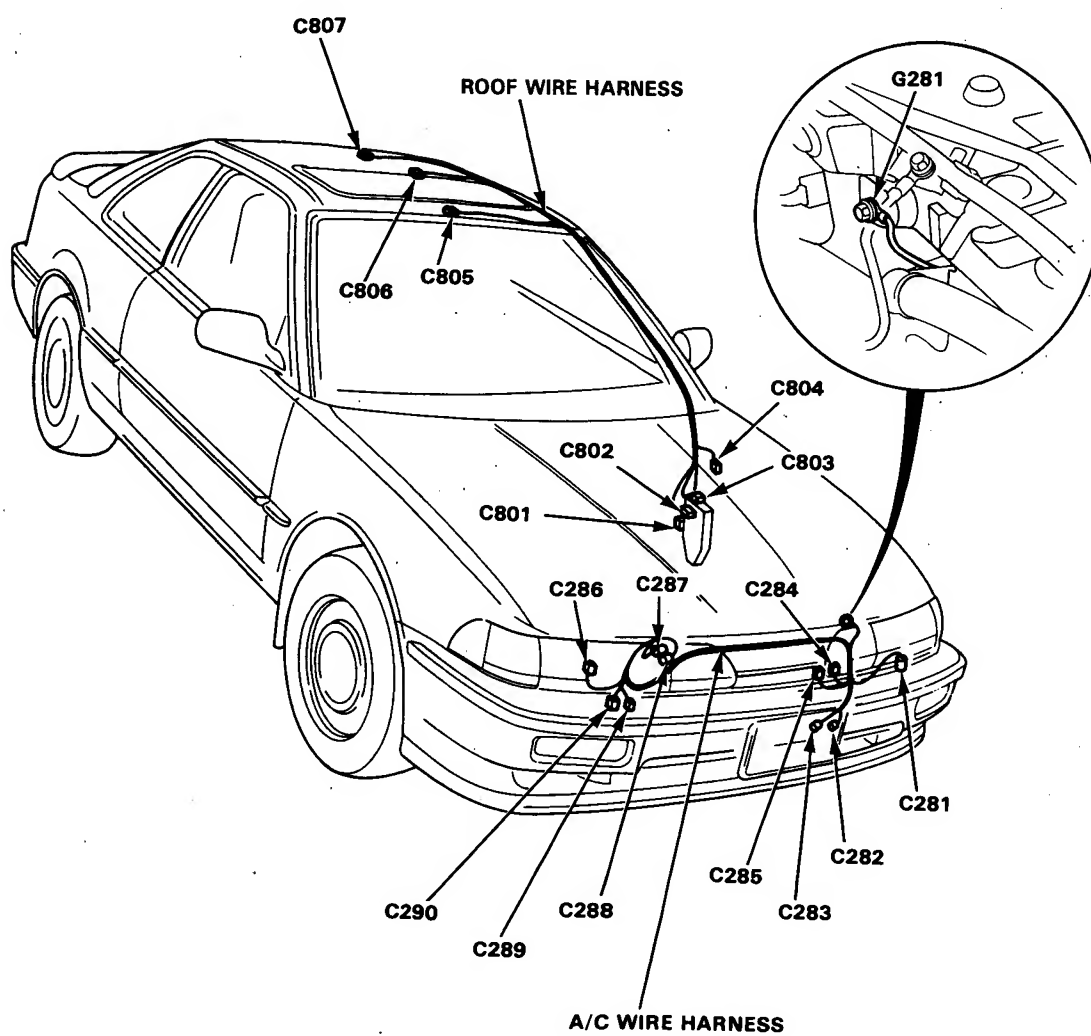
## A/C Wire Harness

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C281	2	Left side of engine compartment	A/C pressure switch	
C282	1	Left side of engine compartment	A/C compressor clutch	
C283	2	Left side of engine compartment	Condenser fan motor	
C284	4	Left side of engine compartment	A/C compressor clutch relay	
C285	4	Left side of engine compartment	Condenser fan relay	
C286	4	Right side of engine compartment	Radiator fan relay	
C287	2	Right side of engine compartment	Radiator fan motor	
C288	2	Right side of engine compartment	Main wire harness (C212)	
C289	2	Right side of engine compartment	Main wire harness (C209)	
C290	6	Right side of engine compartment	Main wire harness (C208)	
G281		Left side of engine compartment	Body ground, via A/C harness	

## Roof wire Harness

C801	2	Behind left kick panel	Main wire harness (C410)	
C802	3	Behind left kick panel	Under-dash fuse/relay box (C912)	*3
C803	4	Behind left kick panel	Moonroof relay	*3
C804	4	Behind left kick panel	Dashboard wire harness (C703)	*3
C805	2	Roof area	Front map light	*3
C806	3	Roof area	Ceiling light	
C807	2	Roof area	Moonroof motor	*3

\*3: With moonroof



# Connector Identification and Wire Harness Routing

## Driver's Door Wire Harness

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C841	6	Left front door area	Rear wire harness (Hatchback: C509)	RS
C841	27	Left front door area	Rear wire harness (Hatchback: C509)	LS, GS, GSR
C841	6	Left front door area	Rear wire harness (Sedan: C560)	RS
C841	27	Left front door area	Rear wire harness (Sedan: C560)	LS, GS
C842	1	Left front door area	Left front speaker (+)	
C843	1	Left front door area	Left front speaker (-)	
C844	4	Left front door area	Driver's power window motor	LS, GS, GSR
C845	3	Left front door area	Driver's door latch switch	(USA)
C846	4	Left front door area	Driver's door lock actuator (Sedan)	LS, GS
C846	4	Left front door area	Driver's door lock actuator (Hatchback)	*
C847	3	Left front door area	Left door lock switch	*4
C848	10	Left front door area	Master power window switch (Hatchback)	LS, GS, GSR
C848	14	Left front door area	Master power window switch (Sedan)	LS, GS
C849	1	Left front door area	Master power window switch (Sedan)	LS, GS
C850	3	Left front door area	Left power mirror	*5

## Right Front Door Wire Harness

C861	6	Right door area	Rear wire harness (Hatchback: C514)	RS
C861	27	Right door area	Rear wire harness (Hatchback: C514)	LS, GS, GSR
C861	6	Right front door area	Rear wire harness (Sedan: C566)	RS
C861	27	Right front door area	Rear wire harness (Sedan: C566)	LS, GS
C862	1	Right front door area	Right front speaker (+)	
C863	1	Right front door area	Right front speaker (-)	
C864	2	Right front door area	Right front power window motor	LS, GS
C865	3	Right front door area	Right front door latch switch	(USA)
C866	2	Right front door area	Right front door lock actuator (Sedan)	LS, GS
C866	2	Right front door area	Right front door lock actuator (Hatchback)	*
C867	3	Right front door area	Right door lock switch	*4
C868	5	Right front door area	Right front power window switch	LS, GS
C869	3	Right front door area	Right power mirror	*5

## Left Rear Door Wire Harness (Sedan: LS, GS)

C881	6	Left rear door area	Rear wire harness (C590)	
C882	2	Left rear door area	Left rear power window motor	
C883	5	Left rear door area	Left rear power window switch	
C884	2	Left rear door area	Left rear door lock actuator	

## Right Rear Door Wire Harness (Sedan: LS, GS)

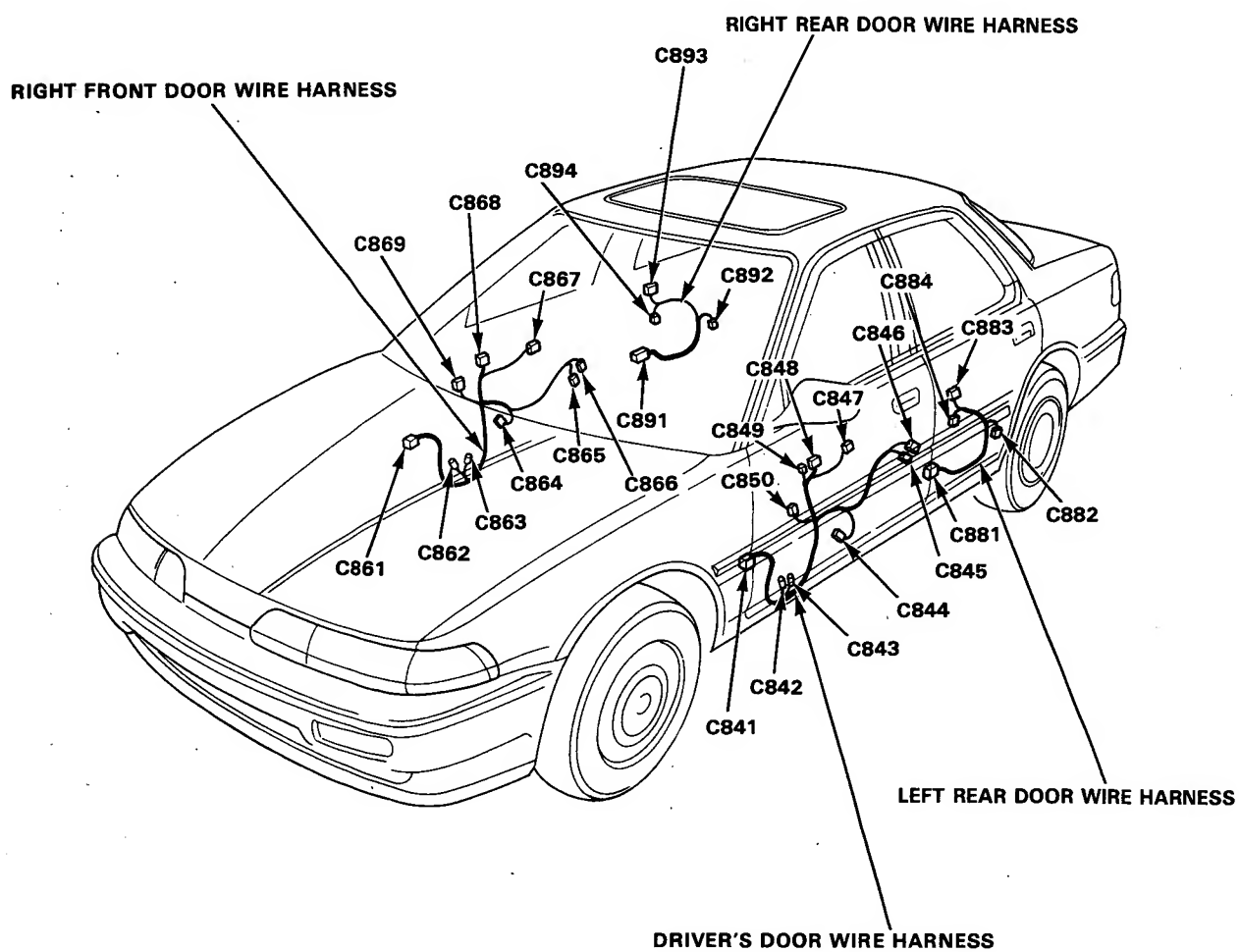
C891	6	Right rear door area	Rear wire harness (C580)	
C892	2	Right rear door area	Right rear power window motor	
C893	5	Right rear door area	Right rear power window switch	
C894	2	Right rear door area	Right rear door lock actuator	

\* : USA (GS, GSR), Canada (LS, GS, GSR)

\*4: Hatchback (USA (GS, GSR), Canada (LS, GS, GSR)), Sedan (LS, GS)

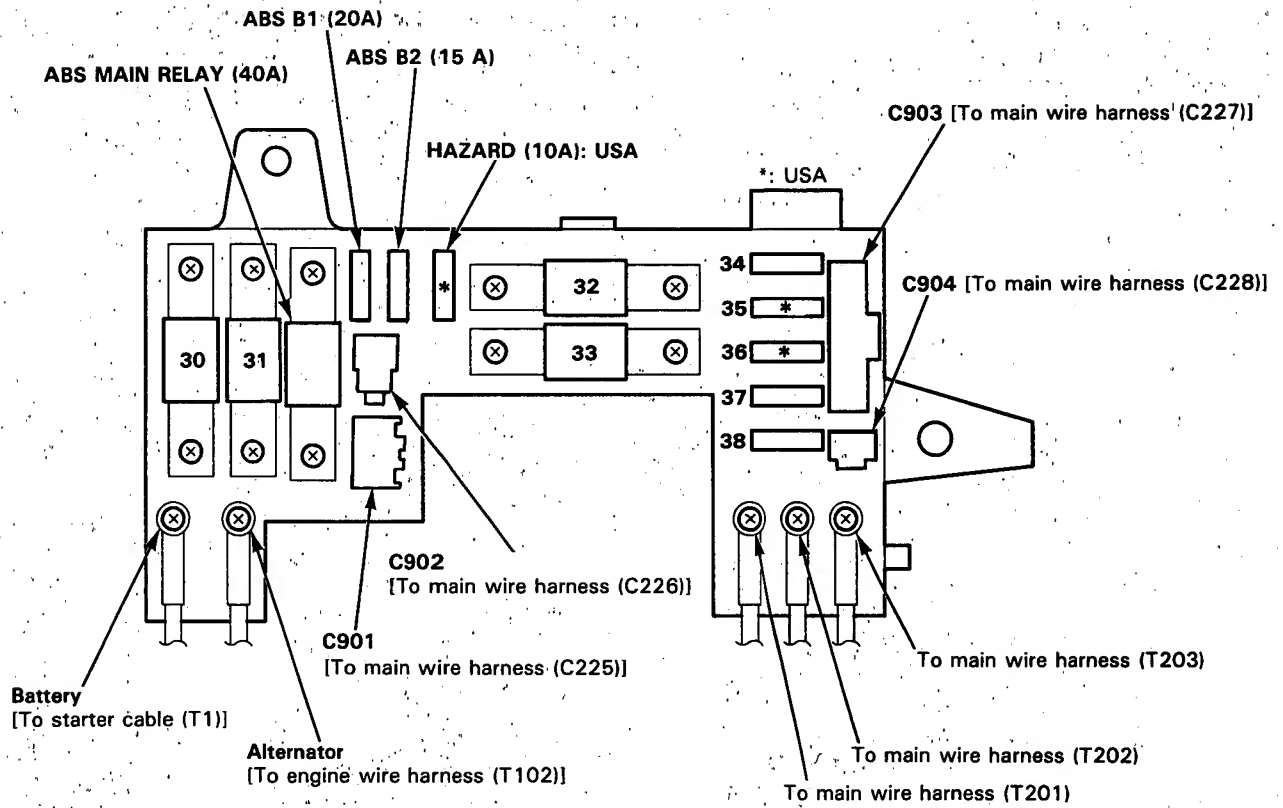
\*5: Hatchback (LS, GS, GSR),

Sedan [USA (LS, GS) Canada (RS, LS, GS)]



# Fuses

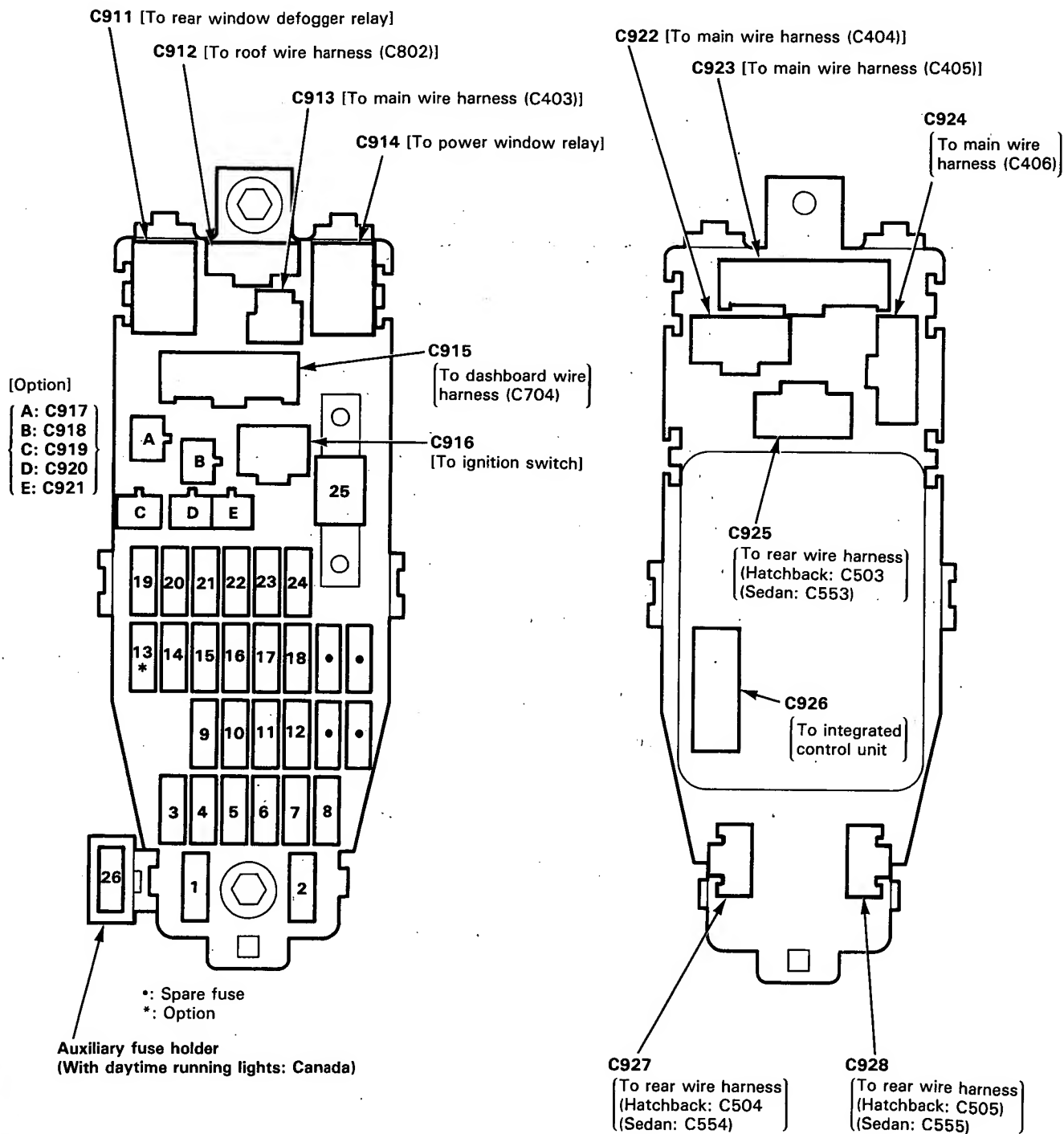
## Under-hood Main Fuse Box







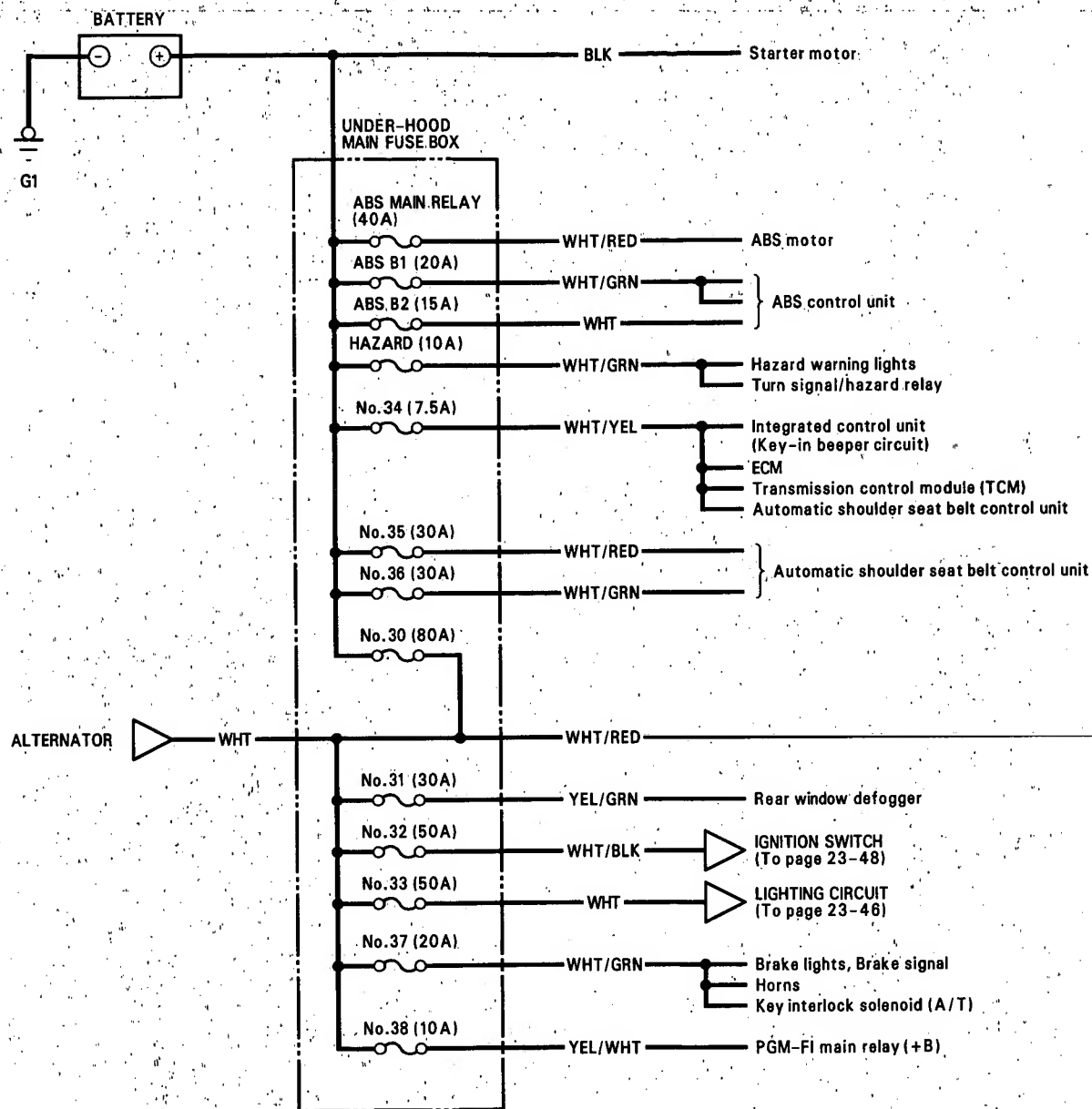
## Under-dash Fuse/Relay Box



# Power Distribution

## Circuit Identification

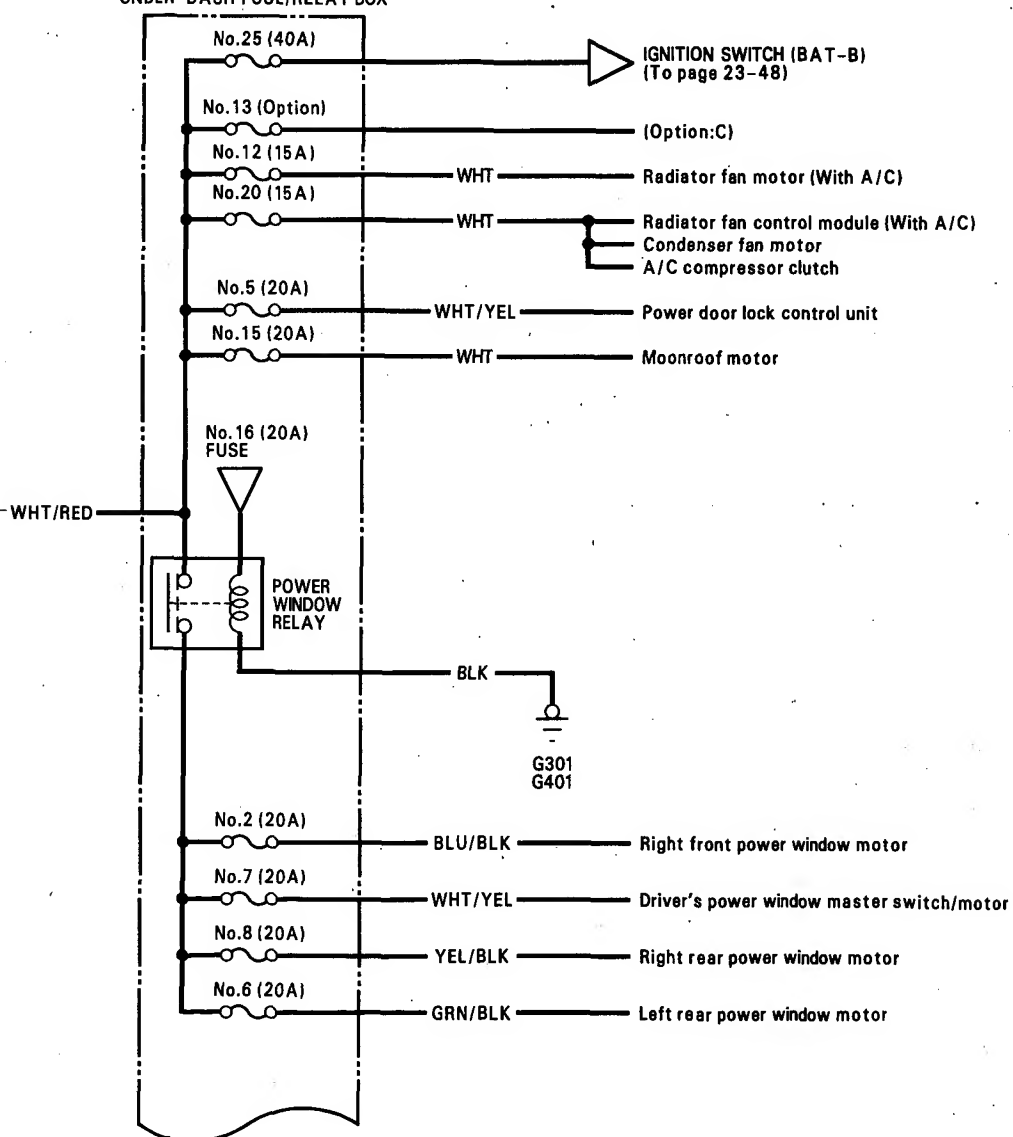
USA:





USA:

UNDER-DASH FUSE/RELAY BOX

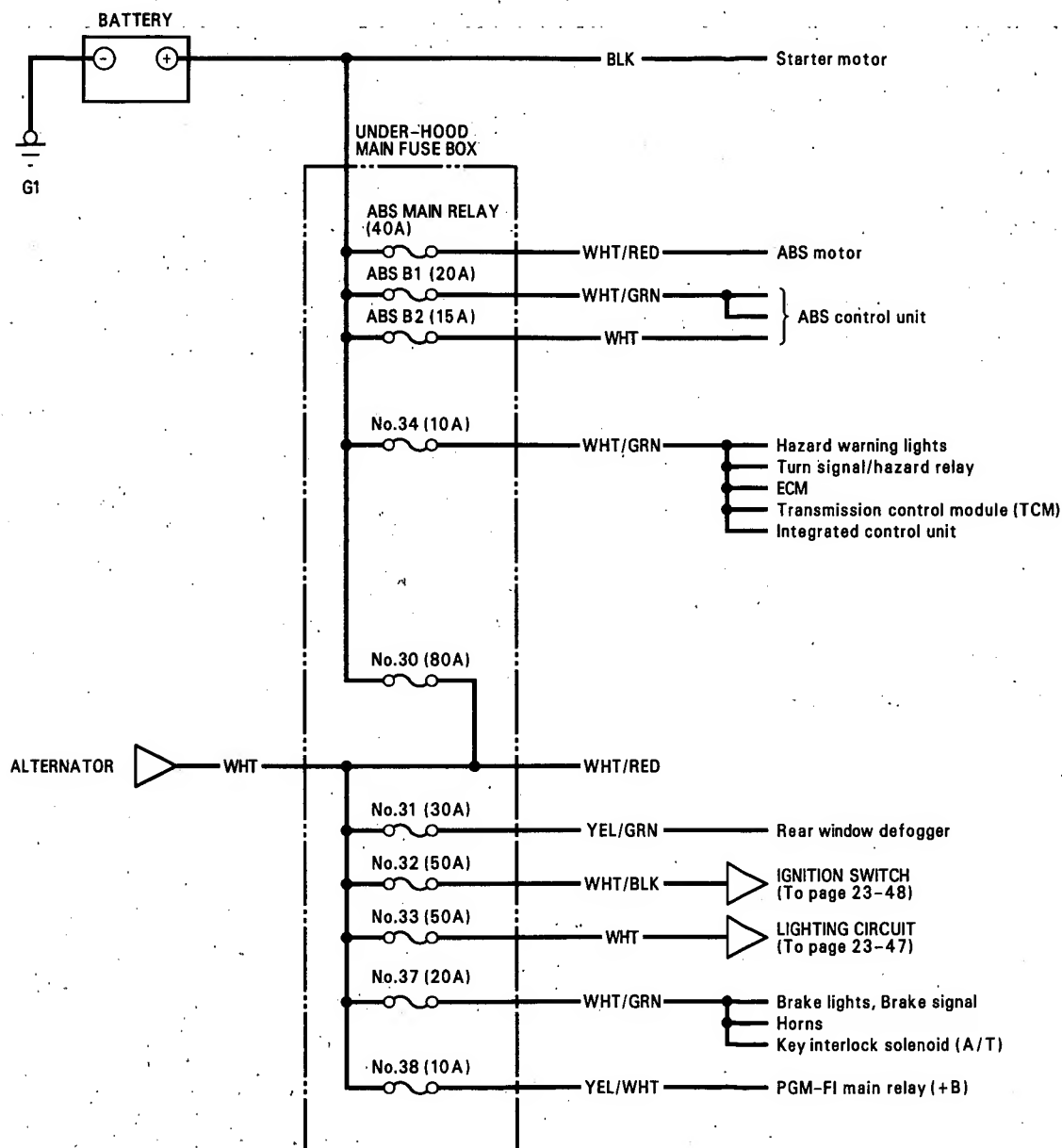


(cont'd)

# Power Distribution

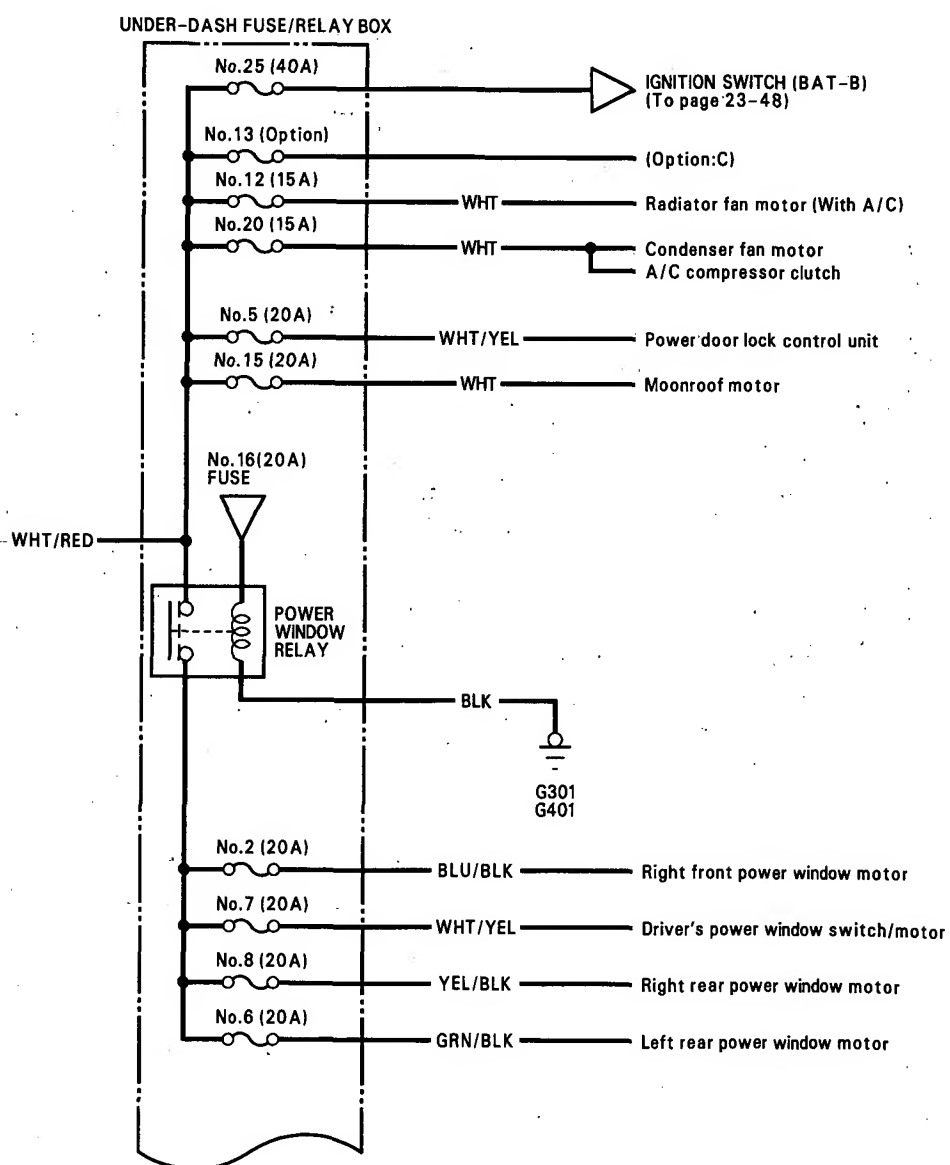
## Circuit Identification

Canada:





Canada:



(cont'd)

# Power Distribution

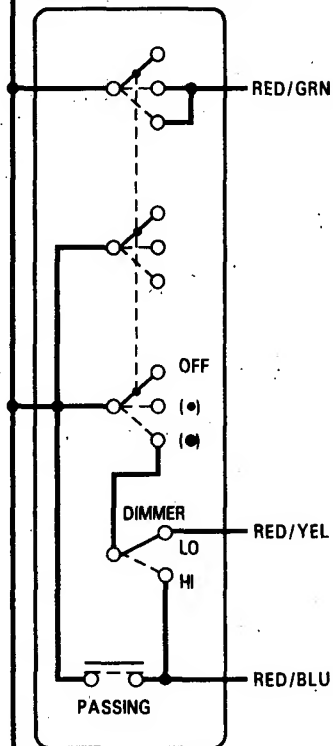
## Circuit Identification (cont'd)

USA:

No.33 (50A) FUSE  
(From page 23-42)

WHT

COMBINATION LIGHT SWITCH



UNDER-DASH FUSE/RELAY BOX

No.11 (15A)

Integrated control unit

(Option:B)

RED/BLK Heater control panel lights  
A/C switch light  
Left } front parking light  
Right }

RED/BLK Dash lights brightness controller  
Dash lights  
Glove box light  
Lights(in dim mode)for clock,  
A/T gear position indicator and  
cruise control indicator

RED/BLK Taillights/rear side marker lights  
License plate lights  
(For trailer)

No.3 (10A)

RED/WHT Right headlight (Low beam)

No.4 (10A)

RED/YEL Left headlight (Low beam)  
Front fog light relay

No.9 (10A)

RED/BLU Right headlight (High beam)

No.10 (10A)

RED/BLU High beam indicator light

RED/GRN Left headlight (High beam)

No.19 (10A)

RED/WHT Front fog lights

No.14 (15A)

(Option:A)

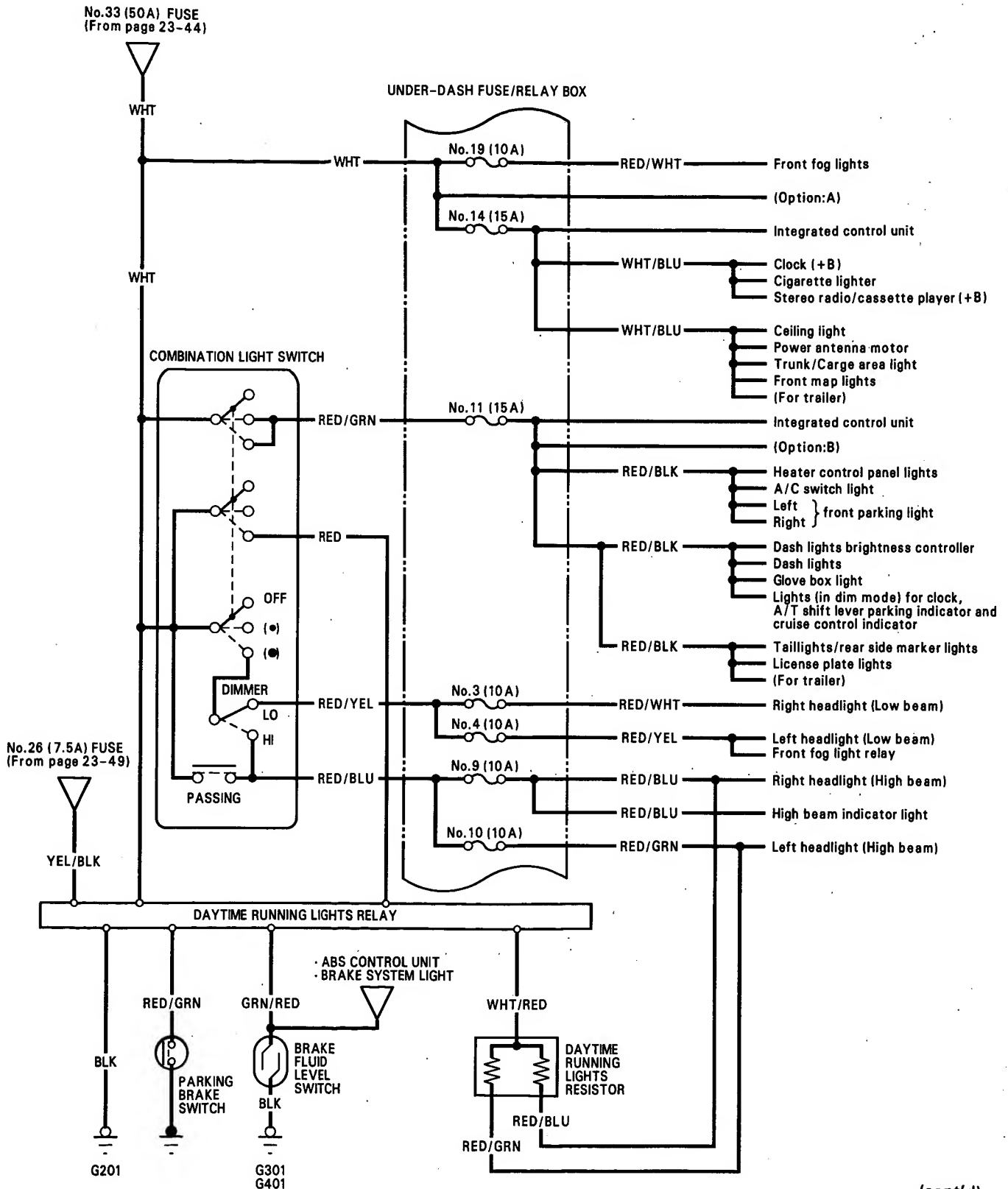
Integrated control unit

WHT/BLU Clock (+B)  
Cigarette lighter  
Stereo radio/cassette player (+B)

WHT/BLU Ceiling light  
Power antenna motor  
Trunk/Cargo area light  
Front map light  
(For trailer)



Canada:



(cont'd)

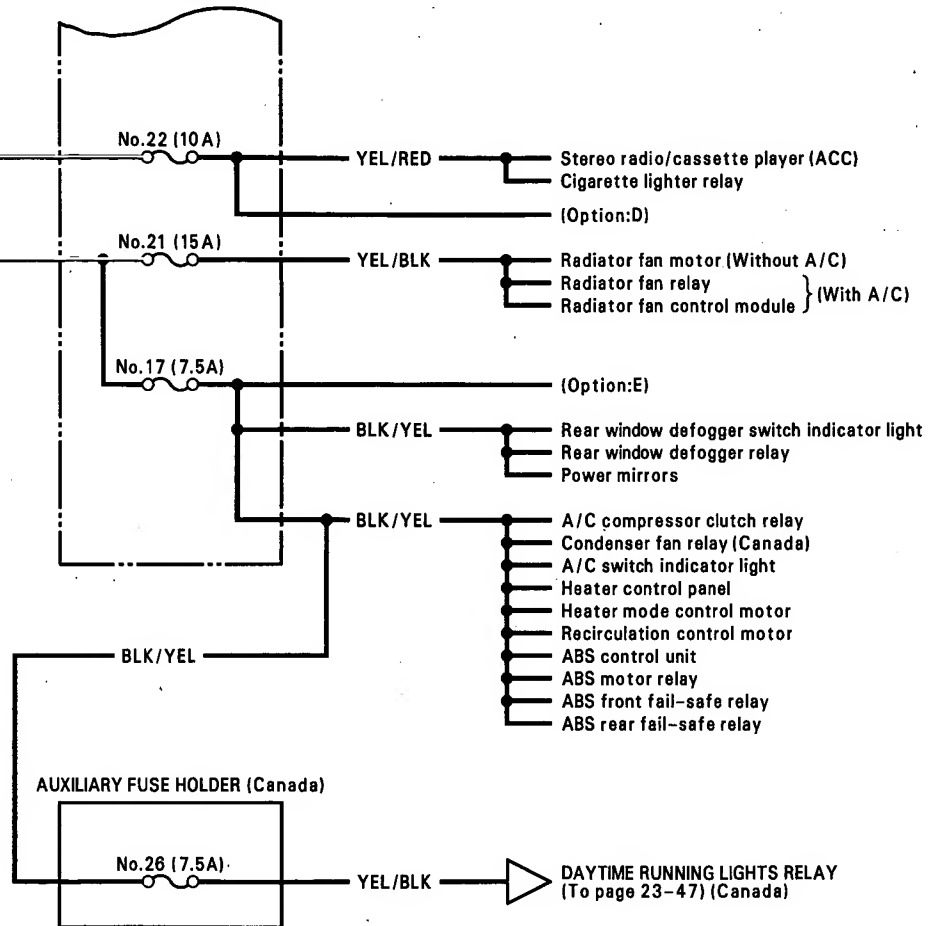
No.32 (50A) FUSE  
(From page 23-42 or 44)





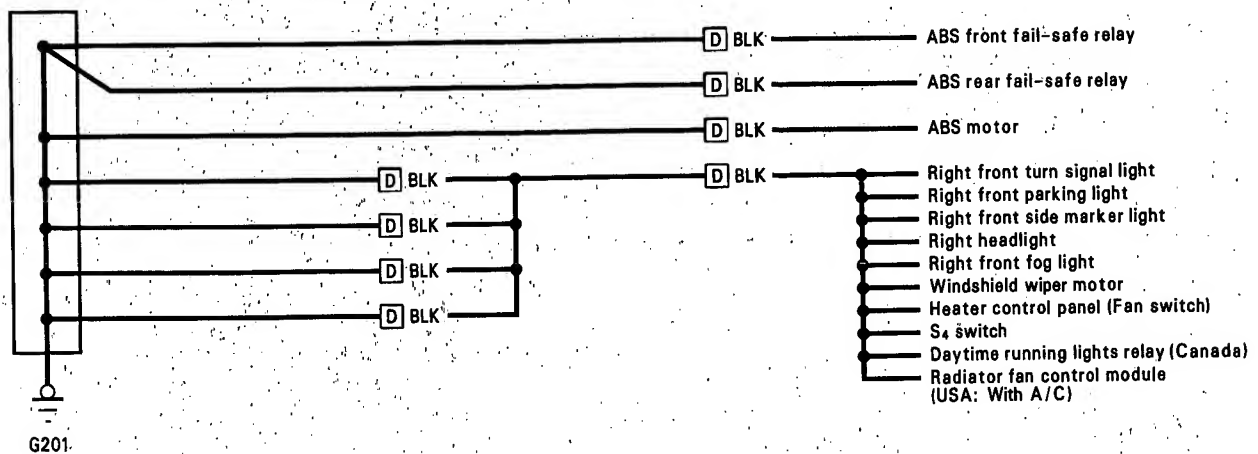
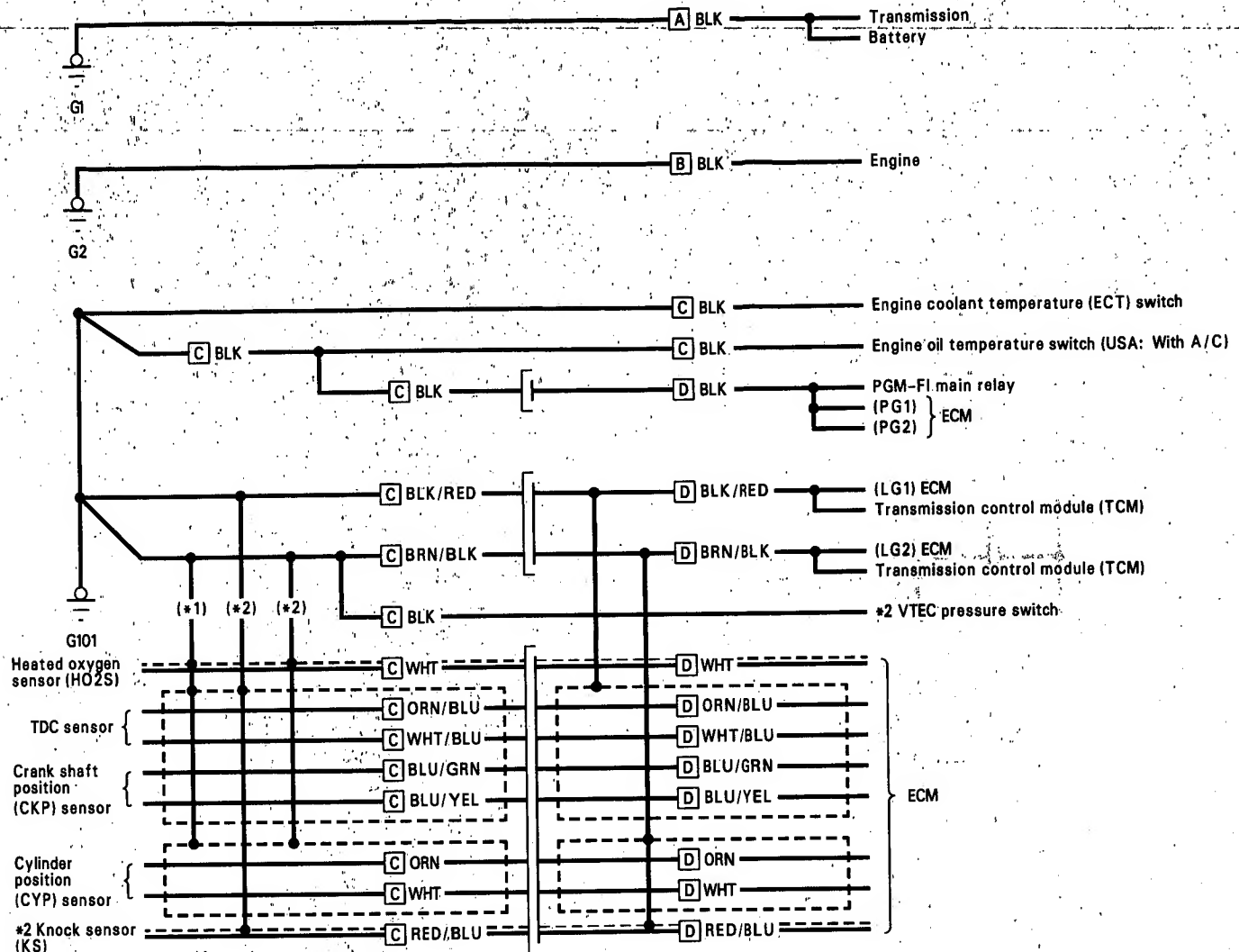


# UNDER-DASH FUSE/RELAY BOX



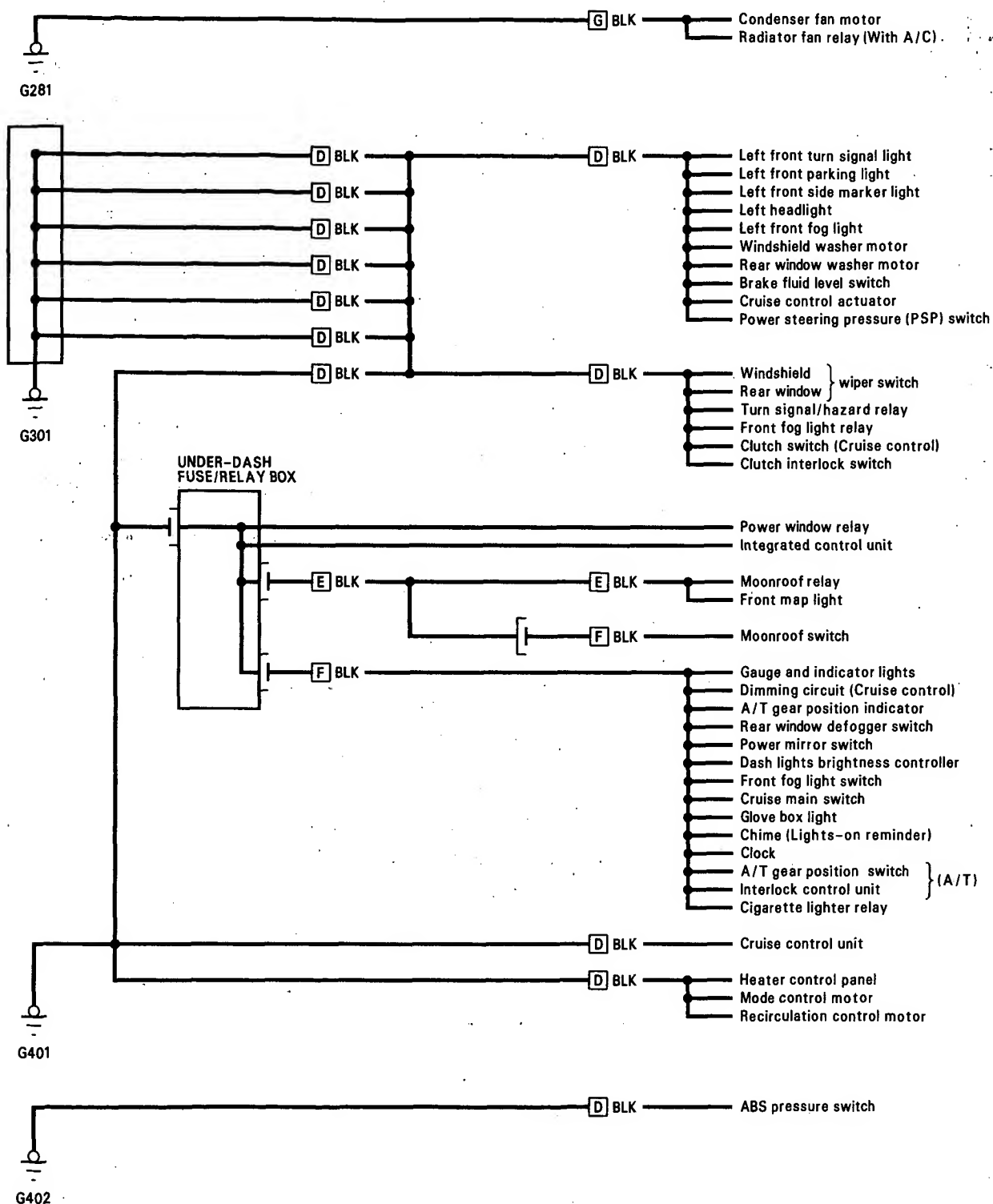
# Ground Distribution

## Circuit Identification



- A** : Battery ground cable
- B** : Engine ground cable
- C** : Engine wire harness
- D** : Main wire harness

- \*1: B18A1 engine
- \*2: B17A1 engine



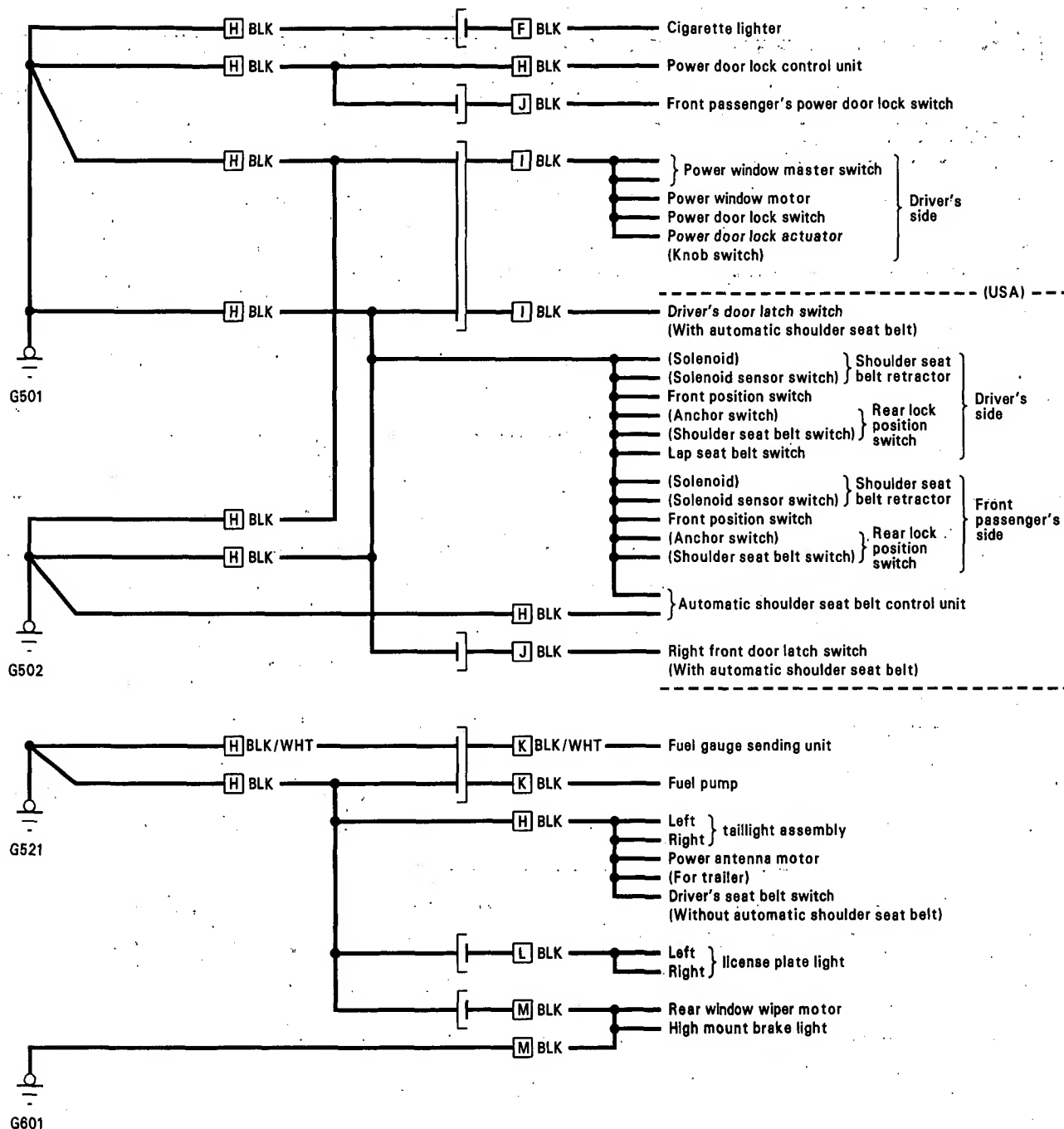
**D** : Main wire harness  
**E** : Roof wire harness  
**F** : Dashboard wire harness

(cont'd)

# Ground Distribution

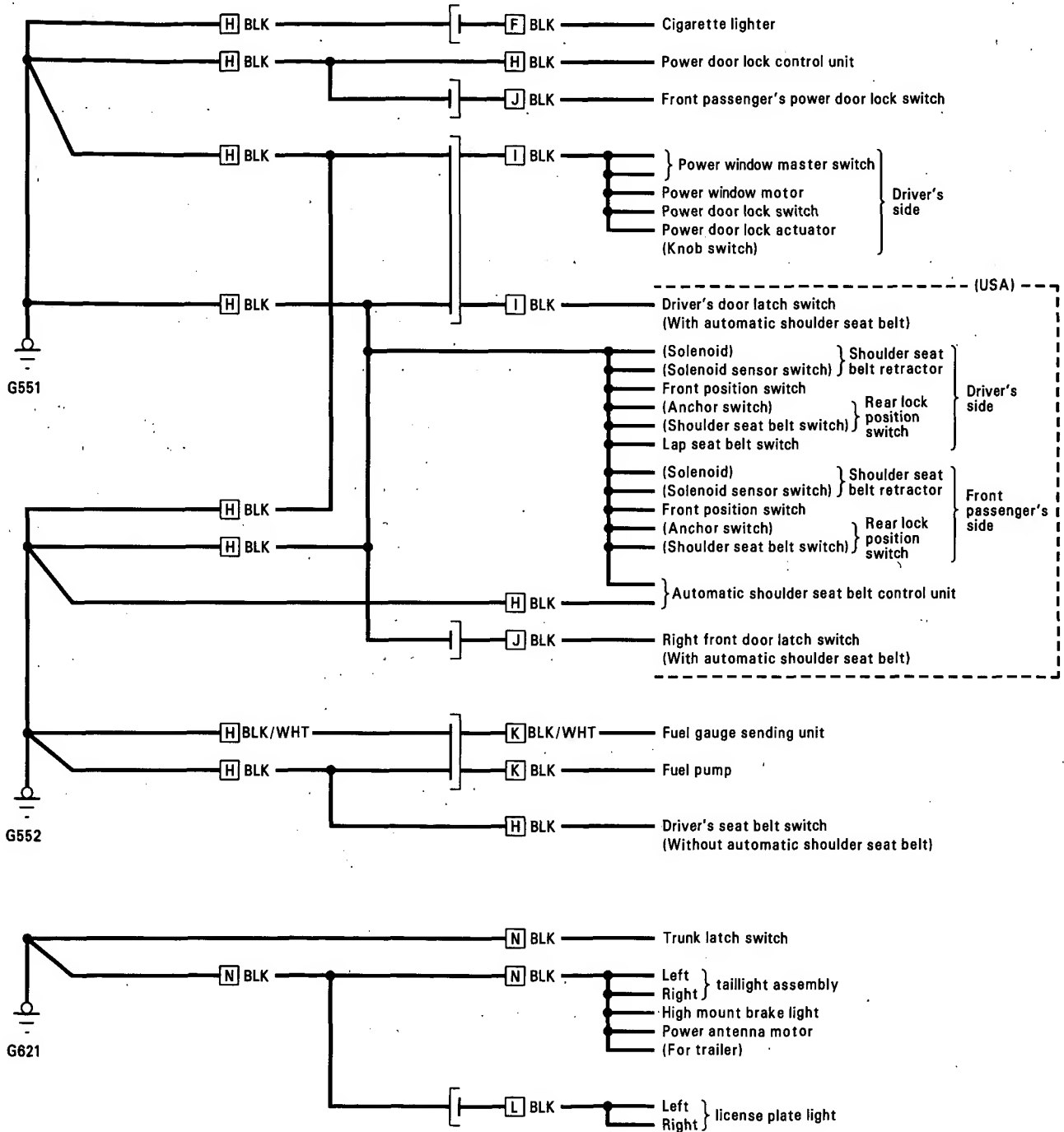
## Circuit Identification (cont'd)

Hatchback:





**Sedan:**



[F] : Dashboard wire harness  
[H] : Rear wire harness  
[I] : Driver's door wire harness

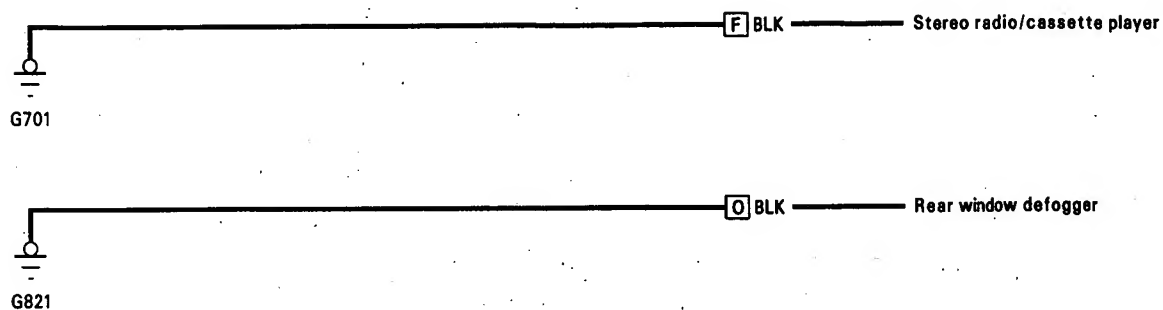
[J] : Right front door wire harness  
[K] : Fuel tank sub-harness

[L] : License plate light sub-harness  
[N] : Trunk wire harness

(cont'd)

# Ground Distribution

## Circuit Identification (cont'd)



**F** : Dashboard wire harness  
**O** : Defogger ground wire



# Battery

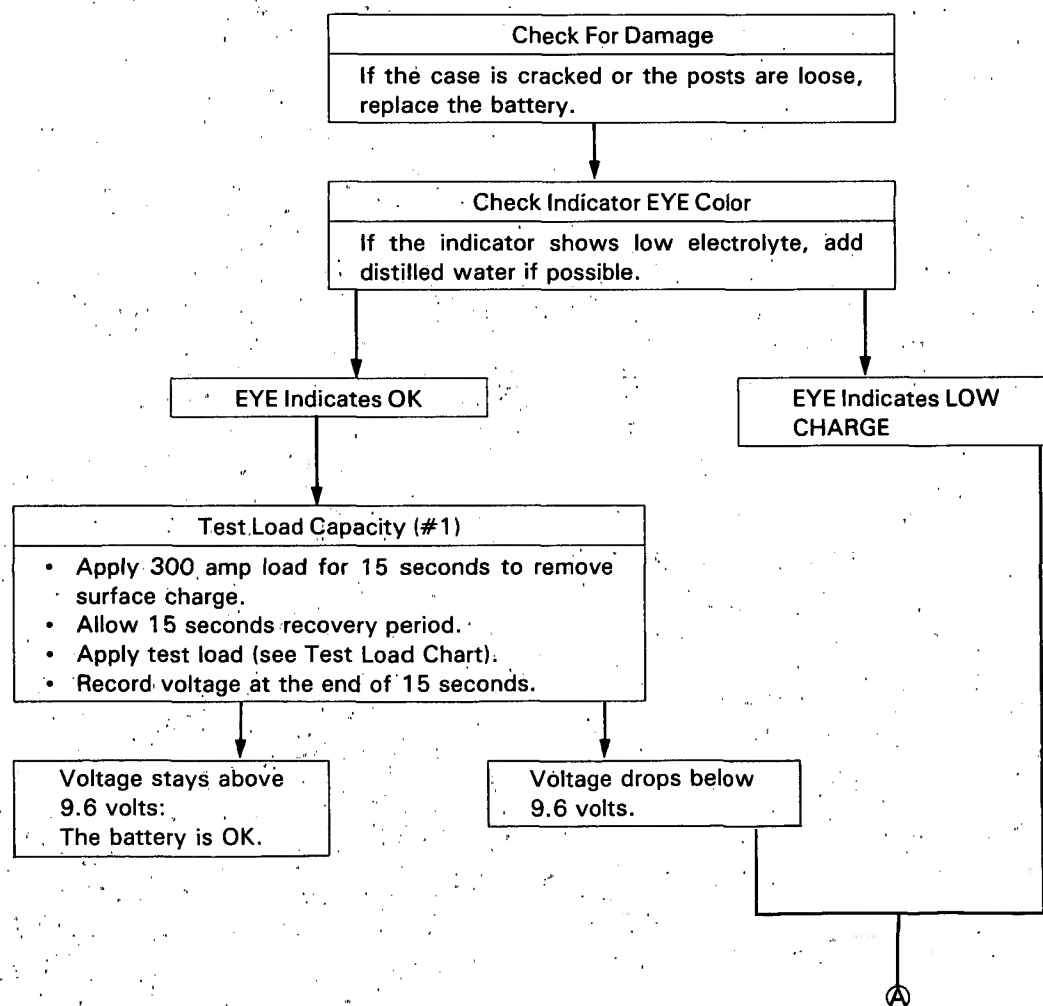
## Test

### ⚠ WARNING

- Battery fluid (electrolyte) contains sulphuric acid. It may cause severe burns if it gets on your skin or in your eyes. Wear protective clothing and a face shield.
  - If electrolyte gets on your skin or clothes, rinse it off with water immediately.
  - If electrolyte gets in your eyes, flush it out by splashing water in your eyes for at least 15 minutes; call a physician immediately.
- A battery gives off hydrogen gas. If ignited, the hydrogen will explode and could crack the battery case and splatter acid on you. Keep sparks, flames, and cigarettes away from the battery.
- Overcharging will raise the temperature of the electrolyte. This may force electrolyte to spray out of the battery vents. Follow the charger manufacturer's instructions and charge the battery at a proper rate.

Use either a JCI or Bear ARBST tester, and follow the manufacturer's procedures. If you don't have one of these computerized testers, follow this conventional test procedure:

To get accurate results, the temperature of the electrolyte must be between 70°F (21°C) and 100°F (38°C).







Ⓐ

### Charge on High Setting (40 amps)

Charge until EYE shows charge is OK; plus an additional 30 minutes to assure full charge.

NOTE: If the battery charge is very low, it may be necessary to bypass the charger's polarity protection circuitry.

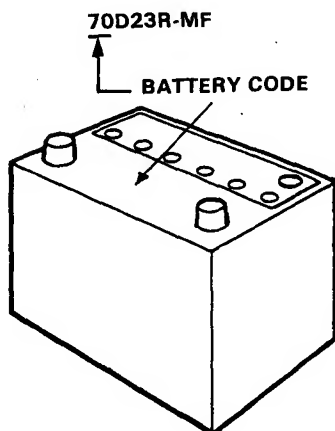
If the EYE does not show charge is OK, within three hours, the battery is no-good; replace it. Write down how long the battery was charged.

### Test Load Capacity (#2)

- Apply 300 amp load for 15 seconds to remove surface charge.
- Allow 15 seconds recovery period.
- Apply test load (see Test Load Chart).
- Record voltage at the end of 15 seconds.

Voltage stays above 9.6 volts: The battery is OK.

Voltage drops below 9.6 volts: The battery is no-good.



### TEST LOAD CHART

Use the test load or 1/2 the cold cranking amps (CCA) printed on the label on the top of the battery. If neither is indicated, use the information below:

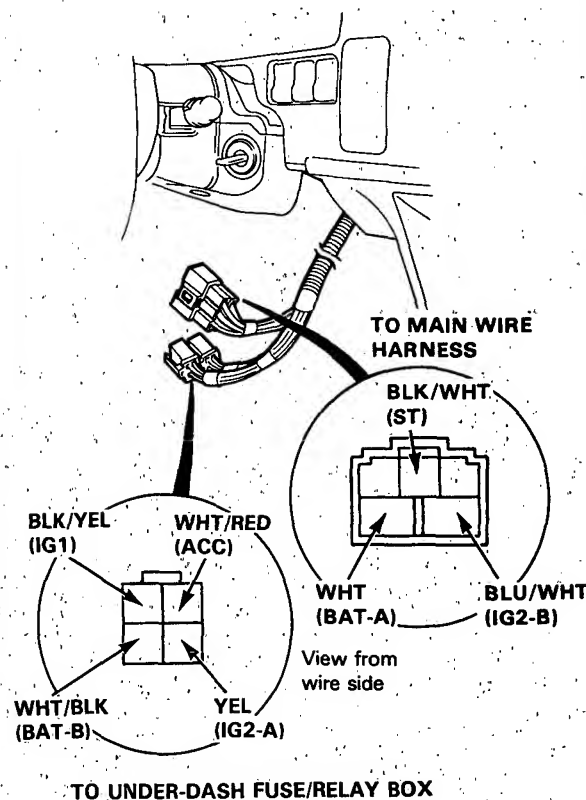
BATTERY CODE	COLD CRANKING AMPS (CCA)	LOAD (amps)
70	440	220

# Ignition Switch

## Test

1. Remove the dashboard lower cover, left-knee bolster, and left kick panel (see page 23-60).
2. Disconnect the 4-P connector from the under-dash fuse/relay box and the 5-P connector from the main wire harness.
3. Check for continuity between the terminals in each switch position according to the table.

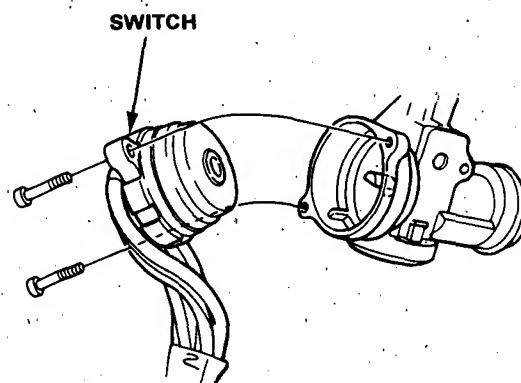
Terminal Position	WHT/ RED (ACC)	WHT/ BLK (BAT -B)	BLU/ WHT (IG2 -B)	WHT (BAT -A)	BLK/ YEL (IG1)	YEL (IG2 -A)	BLK/ WHT (ST)
0							
I	○	○					
II	○	○	○	○	○	○	
III				○	○		○



## Electrical Switch Replacement

1. Remove the steering wheel, then remove the steering column covers (see page 23-60).
2. Remove the dashboard lower cover and left knee bolster (see page 23-60).
3. Disconnect the 4-P connector from the under-dash fuse/relay box and the 5-P connector from the main wire harness.
4. Insert the key and turn it to "0".
5. Remove the two screws and replace the switch.

NOTE: The illustration shows M/T.



6. Install in the reverse order of removal.

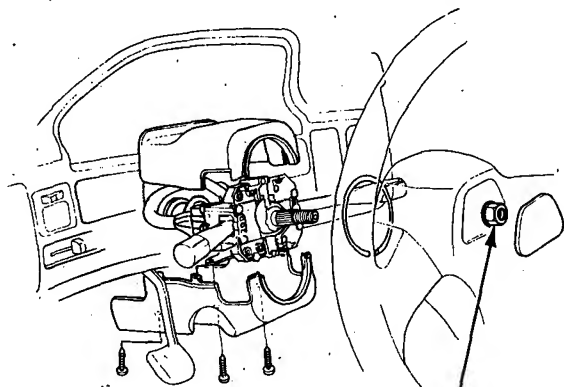


## Lock Cylinder Replacement (M/T)

### NOTE:

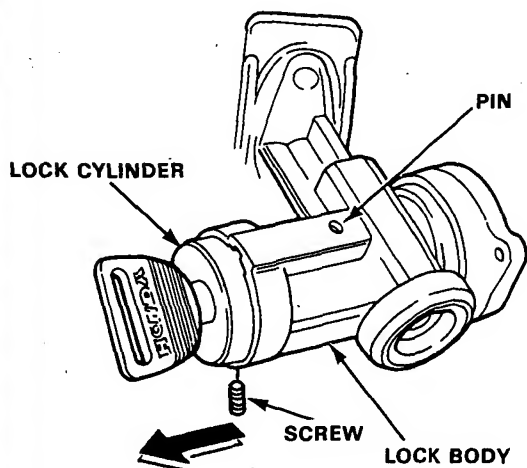
- Replace the steering lock assembly on cars with automatic transmission.
- Before replacement, disconnect the battery negative cable.

1. Remove the steering wheel, then remove the steering column covers.

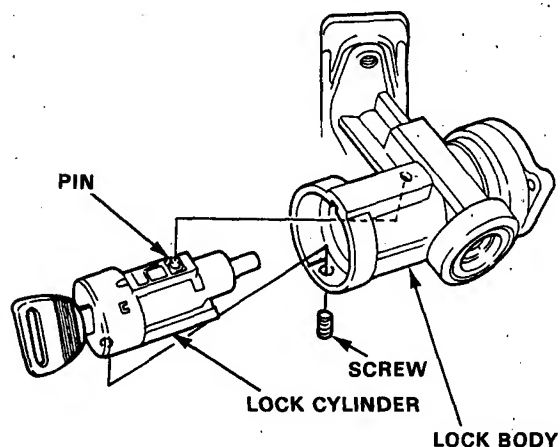


SELF-LOCKING  
NUT 50 N·m  
(5.0 kg-m, 36.2 lb-ft)  
Replace.

2. Turn the ignition key to "I" position.
3. Remove the screw from the lock body.
4. Push the pin in and remove the lock cylinder from the lock body.



5. Turn the key to "O" position and align the new lock cylinder with the lock body.
6. Turn the key almost to "I" position and insert the lock cylinder until the pin touches the body.
7. Turn the key to the "I" position, push the pin and insert the lock body cylinder into the lock until the pin clicks into place.
8. Install the screw to the lock body.



# Ignition Switch

## Steering Lock Replacement

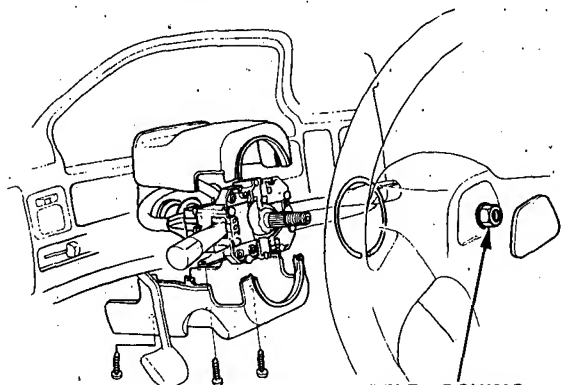
### NOTE:

The radio may have a coded theft protection circuit. Be sure to get the customer's code number before

- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse, (in the under-dash fuse/relay box)
- Removing the radio.

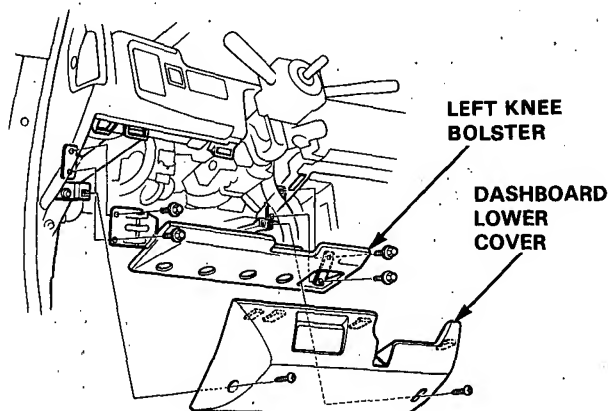
After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

1. Disconnect the battery negative cable before replacement.
2. Remove the steering wheel, then remove the steering column covers.

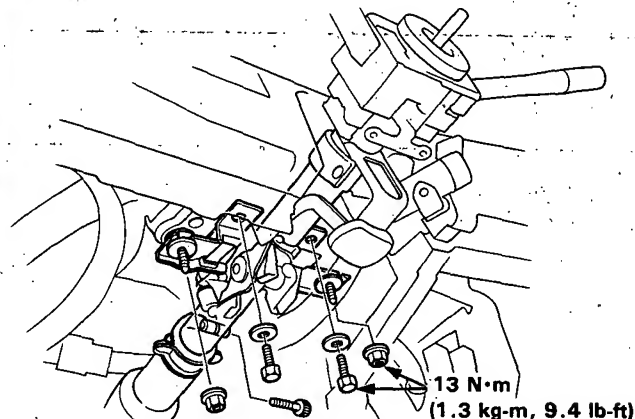


**SELF-LOCKING NUT 50 N·m (5.0 kg-m, 36 lb-ft)**  
Replace.

3. Remove the dashboard lower cover and the left knee bolster.



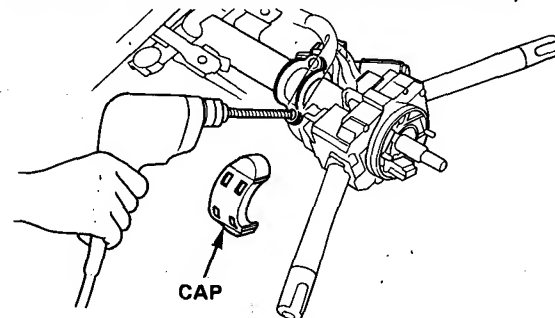
4. Remove the mounting bolts and nuts.



5. Lower the steering column assembly.
6. Center punch each of the two shear bolts and drill their heads off with a 5 mm (3/16 in) drill bit.

**CAUTION:** Do not damage the switch body when removing the shear bolts

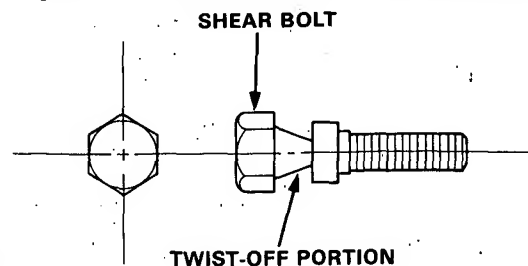
7. Remove the shear bolts from the switch body.



8. Install the new ignition switch without the key inserted.
9. Loosely tighten the new shear bolts.

**NOTE:** Make sure the projection on the ignition switch is aligned with the hole in the steering column.

10. Insert the ignition key and check for proper operation of the steering wheel lock and that the ignition key turns freely.
11. Tighten the shear bolts until the hex heads twist off.



# Starting System



## Component Location Index

- **STARTER INTERLOCK SYSTEM (M/T)**

Description, page 23-62

- **CLUTCH INTERLOCK SWITCH (M/T)**

Test, page 23-66

Switch Position Adjustment, section 12

**STARTER**

Test, page 23-64

Solenoid Test, page 23-67

Replacement, page 23-67

Overhaul, page 23-68

Reassembly, page 23-73

**A/T GEAR POSITION  
SWITCH**

(NEUTRAL POSITION SWITCH)  
(A/T)

Test, page 23-128

Replacement, page 23-129

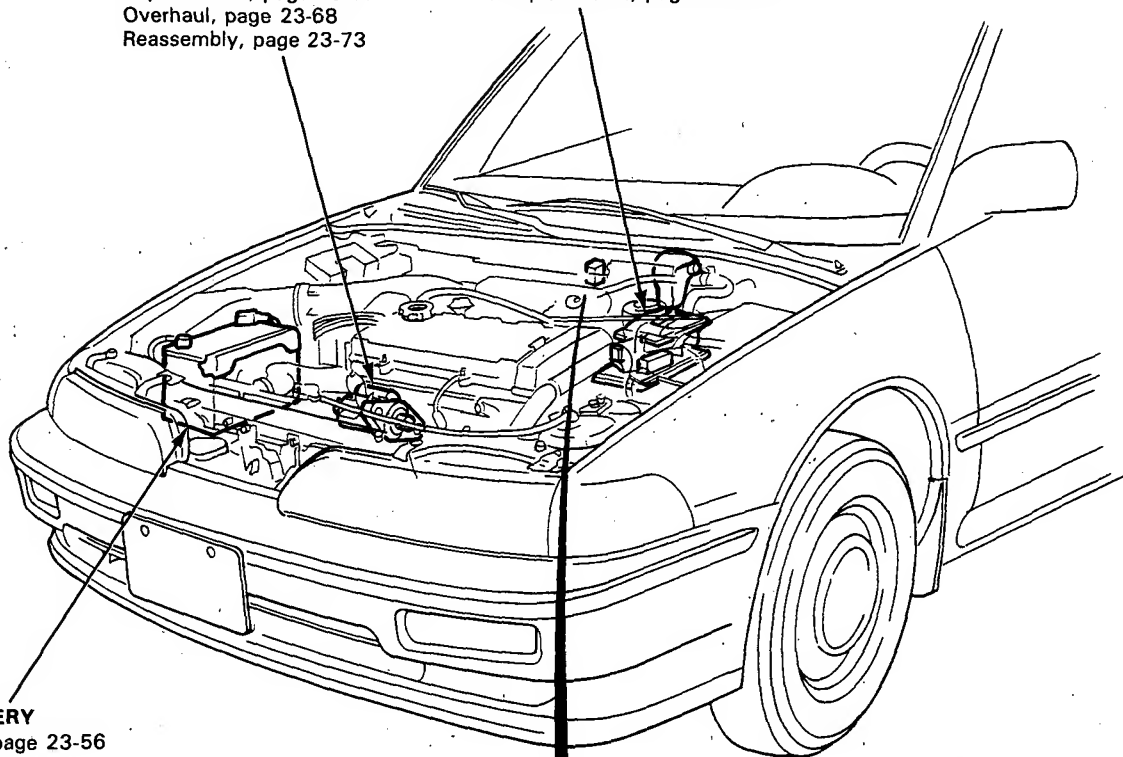
**BATTERY**

Test, page 23-56

**STARTER RELAY (M/T)**

(Located at the right side of the heater unit)

Test, page 23-66



# Starting System

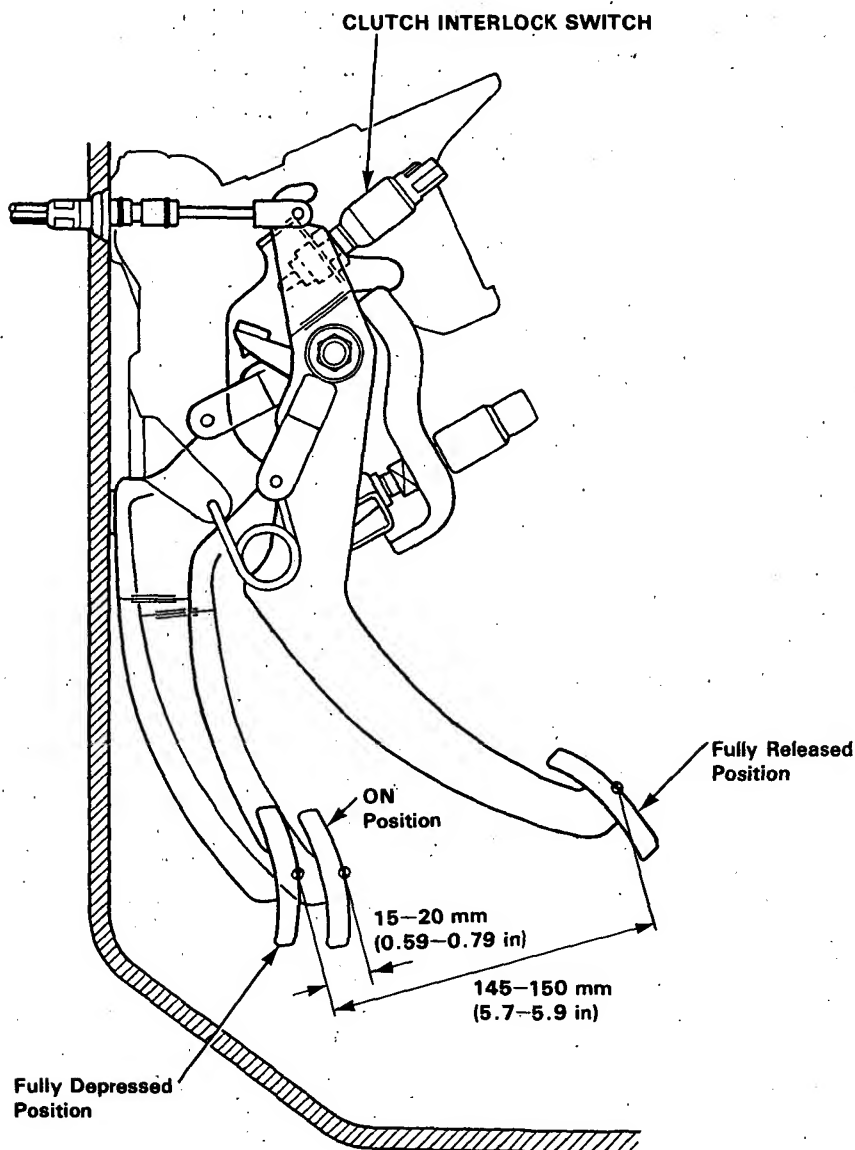
## Description

### Starter Interlock System (M/T):

The starter interlock system prevents the engine from starting unless the clutch pedal is fully depressed.

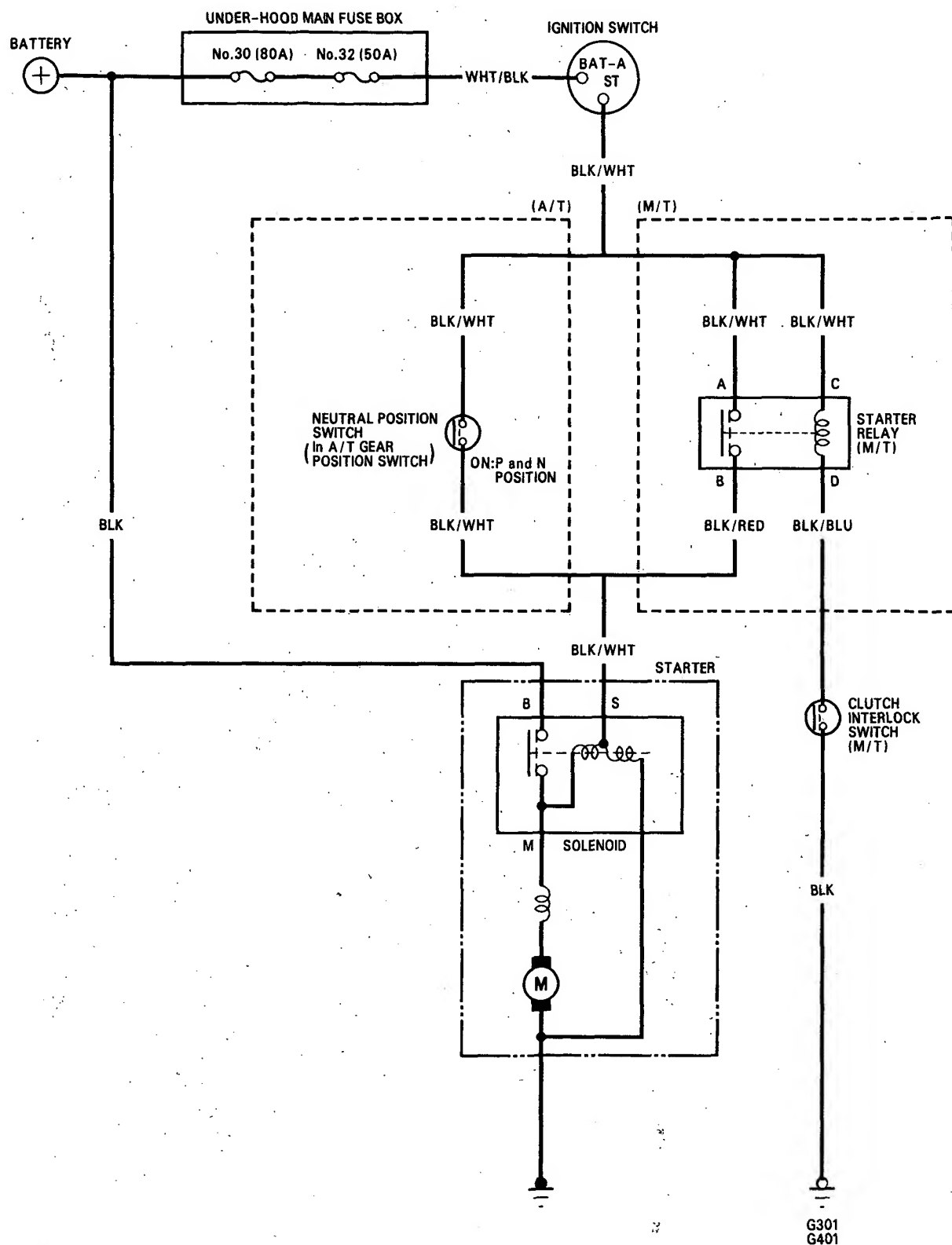
The clutch interlock switch turns on at the position where the clutch disengages: 15–20 mm (0.59–0.79 in) from the fully depressed position.

NOTE: Full stroke of the clutch pedal is 145–150 mm (5.7–5.9 in) from the fully released position.





## Circuit Diagram



# Starting System

## Starter Test

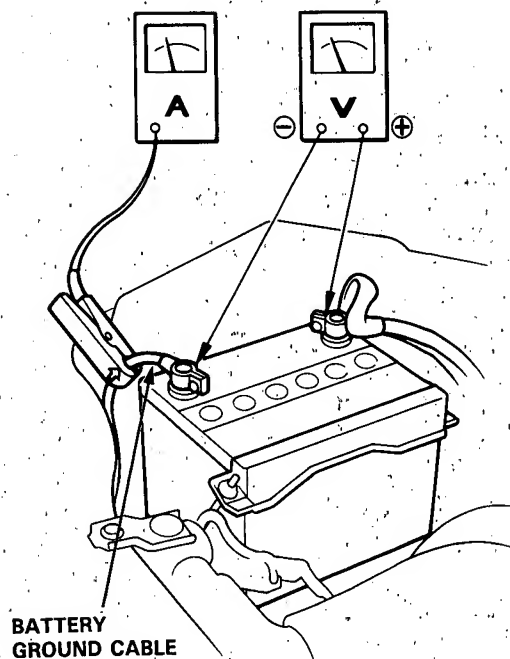
**NOTE:** The air temperature must be between 59 and 100°F (15 and 38°C) before testing.

### Recommended Procedure:

- Use a starter system tester.
- Connect and operate the equipment in accordance with manufacturer's instructions.
- Test and troubleshoot as described.

### Alternate Procedure:

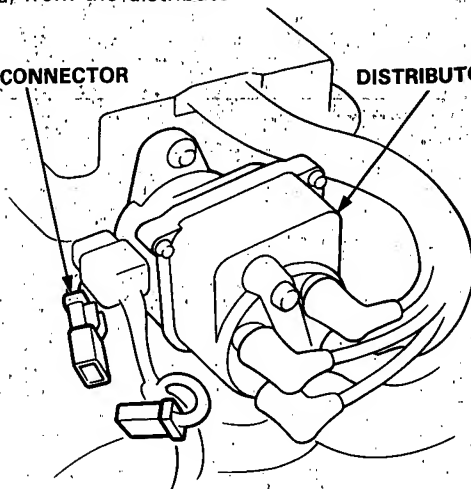
- Use the following equipment:
  - Ammeter, 0–400 A
  - Voltmeter, 0–20 V (accurate within 0.1 volt)
  - Tachometer, 0–1200 rpm
- Hook up voltmeter and ammeter as shown.



1. Disconnect the 2-P connector (ignition coil primary lead) from the distributor.

2-P CONNECTOR

DISTRIBUTOR

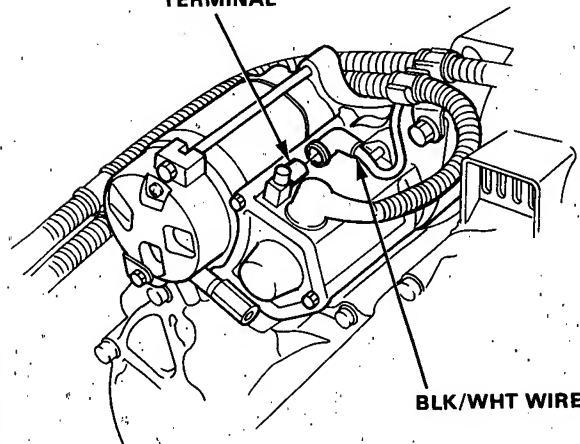


2. Check the starter engagement: Press the clutch pedal all the way in (M/T), and turn the ignition switch to "START". The starter should crank the engine.

**NOTE:** On cars equipped with manual transmission, the engine will not crank unless the clutch pedal is fully depressed.

- If the starter does not crank the engine, check the battery, battery positive cable, ground, and the wire connections for looseness and corrosion.
- Test again. If the starter still does not crank the engine, bypass the ignition switch circuit as follows (make sure the transmission is in neutral): Unplug the connector (BLK/WHT wire) from the starter. Connect a jumper wire from the battery positive (+) terminal to the solenoid terminal. The starter should crank the engine.

SOLENOID  
TERMINAL







— If the starter still does not crank the engine, remove it and diagnose its internal problems.

— If the starter cranks the engine, check for an open in the BLK/WHT wire circuit between the starter and ignition switch, and connectors. Check the ignition switch.

On cars with automatic transmission, check the A/T gear position switch (neutral position switch) and connector.

On cars with manual transmission, check the starter relay, clutch interlock switch, and connectors.

NOTE: Check the No. 32 (50 A) fuse (in the underhood main fuse box) and the starter cut relay.

3. Check for wear or damage:

The starter should crank the engine smoothly and steadily.

If the starter engages, but cranks the engine erratically, remove the starter motor. Inspect the starter, drive gear, and flywheel ring gear for damage.

Check the drive gear overrunning clutch for binding or slipping when the armature is rotated with the drive gear held. Replace the gears if damaged.

4. Check cranking voltage and current draw,

Voltage should be no less than 8.0 volts.

Current should be no more than 350 amperes.

If voltage is too low, or current draw too high, check for:

- Low battery.
- Open circuit in starter armature commutator segments.
- Starter armature dragging.
- Shorted armature winding.
- Excessive drag in engine.

5. Check cranking rpm:

Engine speed, during cranking should be above 100 rpm. If it is not, check for:

- Loose battery or starter terminals.
- Excessively worn starter brushes.
- Open circuit in commutator segments.
- Dirty or damaged helical spline or drive gear.
- Defective drive gear overrunning clutch.

6. Check the starter disengagement:

Press the clutch pedal all the way in (M/T), turn the ignition switch to "III" position and release to "II" position. The starter drive gear should disengage from the flywheel ring gear.

If the drive gear hangs up on the flywheel ring gear, check for:

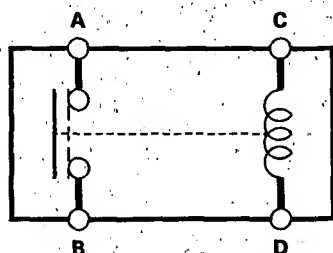
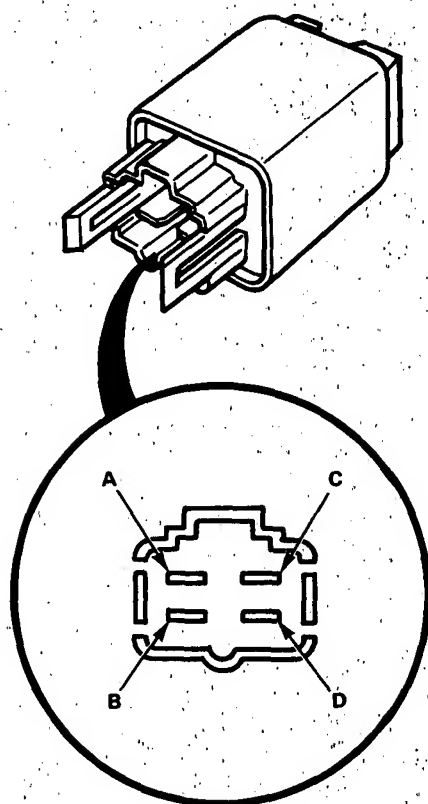
- Solenoid plunger and switch malfunction.
- Dirty drive gear assembly or damaged overrunning clutch.

# Starting System

## Starter Relay Test (M/T)

"Normally open" Type:

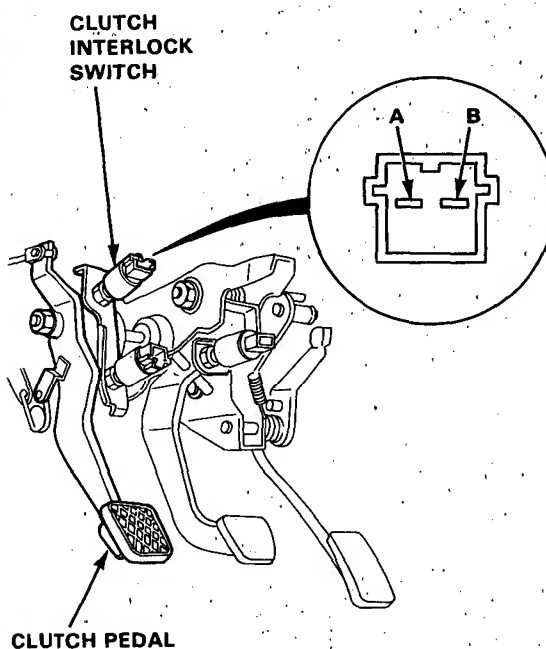
1. Remove the starter relay and disconnect it from the harness.
2. There should be continuity between the C and D terminals.
3. There should be continuity between the A and B terminals when battery power and ground are connected to the C and D terminals. There should be no continuity when power is disconnected.



## Clutch Interlock Switch Test (M/T)

1. Remove the dashboard lower cover and knee bolster, then disconnect the 2-P connector from the switch.
2. Check for continuity between the terminals according to the table:

Terminal	A	B
Clutch Pedal		
RELEASED		
PUSHED	○	○



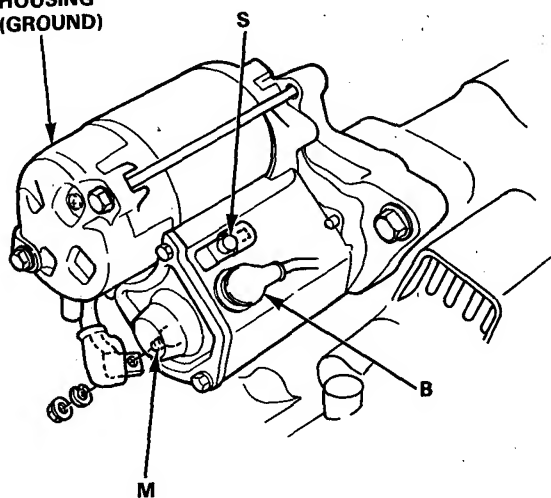
3. If necessary, replace the switch or adjust its position (see section 12).



## Starter Solenoid Test

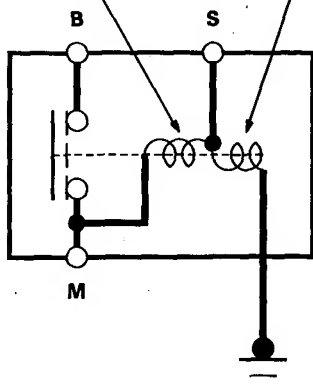
1. Check the hold-in coil for continuity between the S terminal and the armature housing (ground). If there is continuity, the coil is OK.
2. Check the pull-in coil for continuity between the S and M terminals. If there is continuity, the coil is OK.

ARMATURE  
HOUSING  
(GROUND)



PULL-IN COIL

HOLD-IN COIL



## Starter Replacement

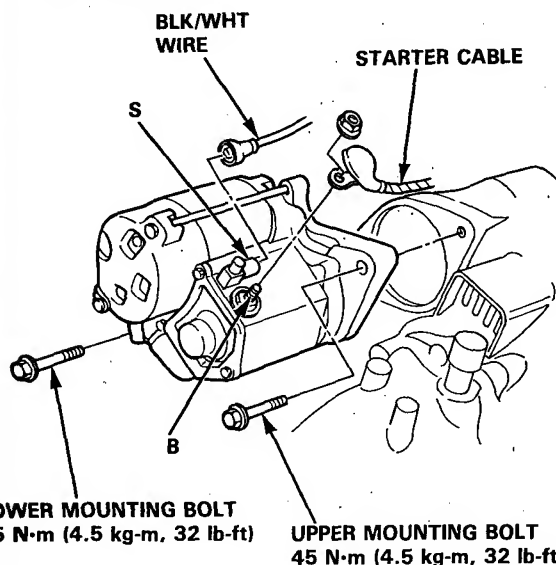
### NOTE:

The radio may have a coded theft protection circuit. Be sure to get the customer's code number before

- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse. (in the under-dash fuse/relay box)
- Removing the radio.

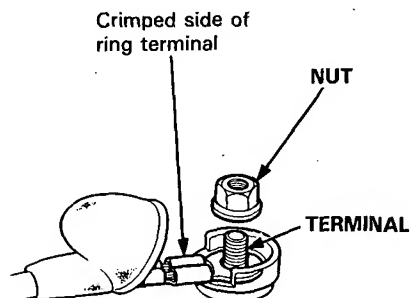
After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code restore radio operation.

1. Disconnect the negative cable from the battery.
2. Disconnect the starter cable from the B terminal on the solenoid, then the BLK/WHT wire from the S terminal.
3. Remove the two bolts holding the starter, and remove the starter.



4. Install in the reverse order of removal.

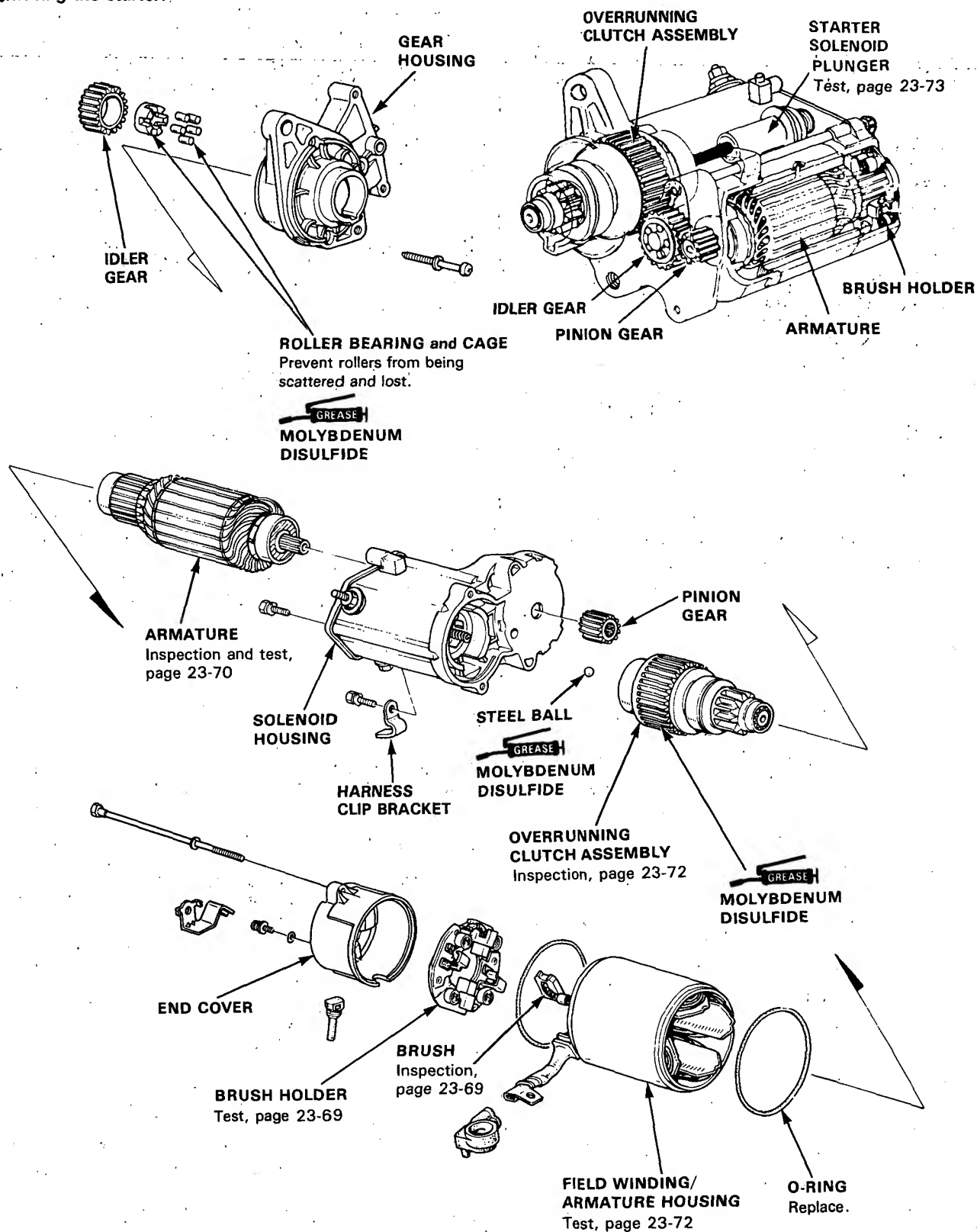
NOTE: When installing the starter cable, make sure that the crimped side of the ring terminal is facing out.



# Starting System

## Starter Overhaul

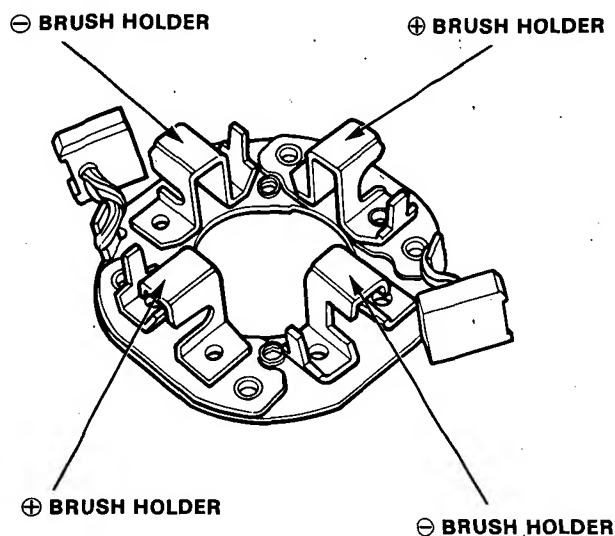
**CAUTION:** Disconnect the battery negative cable before removing the starter.





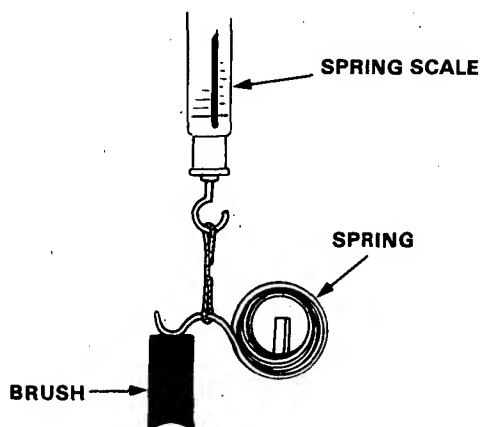
## Starter Brush Holder Test

1. Check that there is no continuity between the  $\oplus$  and  $\ominus$  brush holders. If continuity exists, replace the brush holder assembly.



2. Insert the brush into the brush holder, and bring the brush into contact with the commutator, then attach a spring scale to the spring. Measure the spring tension at the moment the spring lifts off the brush.

**Spring Tension: 17–24 N (1.7–2.4 kg, 3.7–5.3 lbs)**



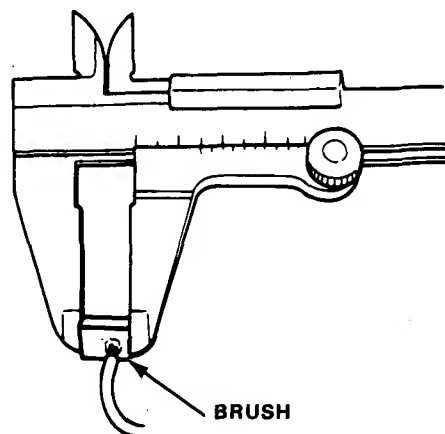
## Starter Brush Inspection

Measure the brush length. If it is not within service limit, replace the armature housing and brush holder assembly.

### Brush Length

**Standard (New): 15.0–15.5 mm (0.59–0.61 in.)**

**Service Limit: 10.0 mm (0.39 in.)**



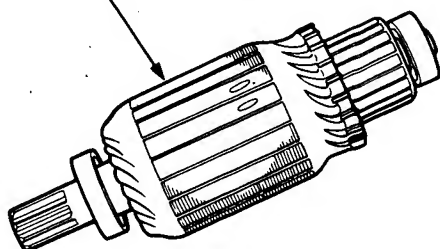
**NOTE:** To seat new brushes after installing them in their holders, slip a strip of #500 or #600 sandpaper, with the grit side up, over the commutator, and smoothly rotate the armature. The contact surface of the brushes will be sanded to the same contour as the commutator.

# Starting System

## Armature Inspection and Test

1. Inspect the armature for wear or damage due to contact with the field coil magnets.

Inspect for damage



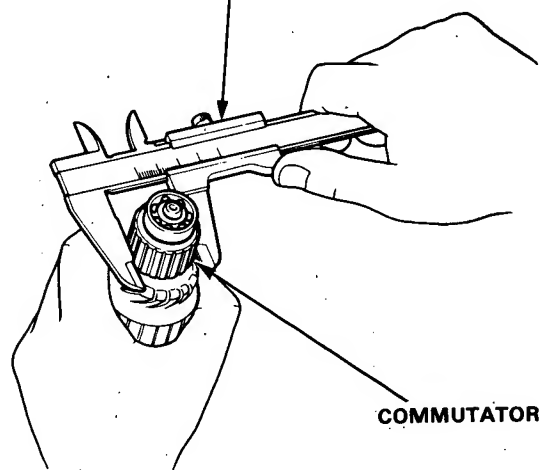
2. A dirty or burnt commutator surface may be resurfaced with emery cloth or a lathe within the following specifications.

### Commutator Diameter

**Standard (New):** 29.9–30.0 mm (1.177–1.181 in.)

**Service Limit:** 29.0 mm (1.14 in.)

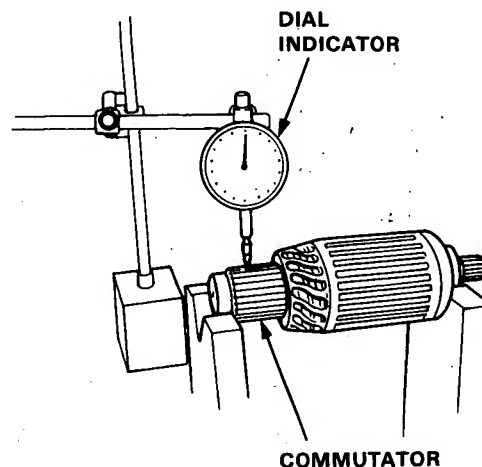
VERNIER CALIPER



### Commutator Runout

**Standard (New):** 0–0.02 mm (0–0.001 in.)

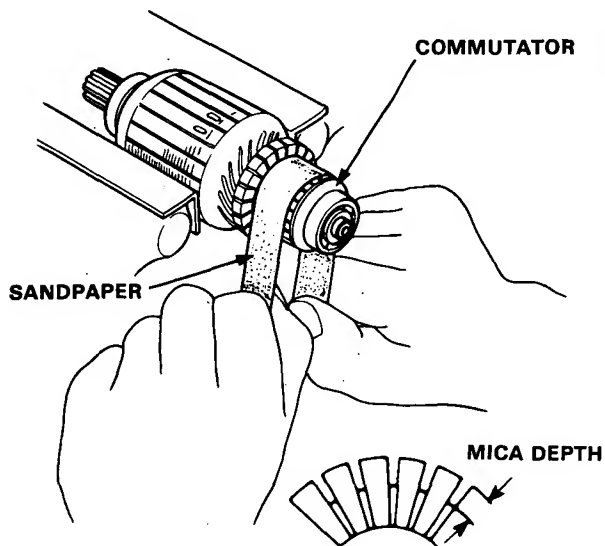
**Service Limit:** 0.05 mm (0.002 in.)



3. If the commutator runout and diameter are within specifications, check the commutator for damage and for carbon dust or brass chips between the segments.



4. If the surface is dirty, recondition it with a # 500 or # 600 sandpaper. Then, check mica depth. If necessary, undercut the mica with a hacksaw blade to achieve proper depth.

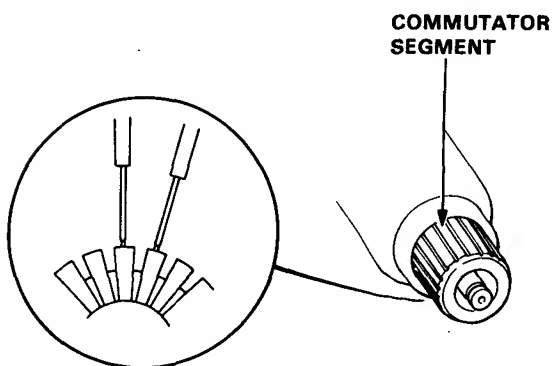


**Commutator Mica Depth**

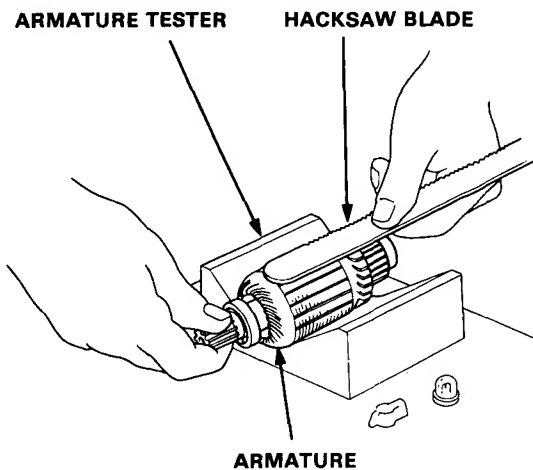
**Standard (New):** 0.5–0.8 mm (0.019–0.031 in.)

**Service Limit:** 0.2 mm (0.008 in.)

5. Check for continuity between the segments of the commutator. If an open circuit exists between any segments, replace the armature.

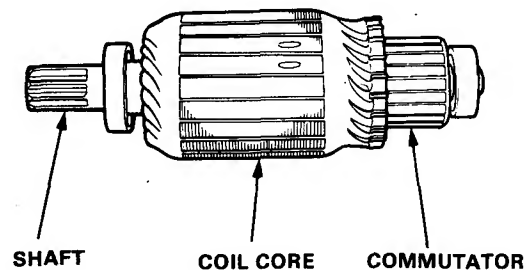


6. Place the armature on an armature tester. Hold a hacksaw blade on the armature core.



If the blade is attracted to the core or vibrates while the core is turned, the armature is shorted; replace it.

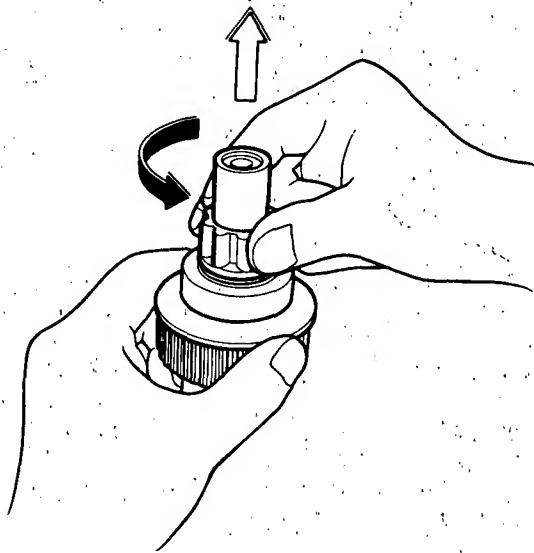
7. Check with an ohmmeter that no continuity exists between the commutator and the armature coil core, and between the commutator and the armature shaft. If continuity exists, replace the armature.



# Starting System

## Overrunning Clutch Inspection

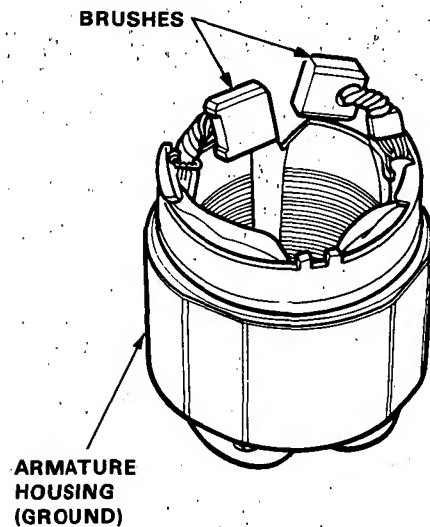
1. Slide the overrunning clutch along the shaft. Does it move freely? If not, replace it.
2. Rotate the overrunning clutch both ways. Does it lock in one direction and rotate smoothly in reverse? If it does not lock in either direction or it locks in both directions, replace it.



3. If the starter drive gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately.
4. Check the condition of the flywheel or torque converter ring gear if the starter drive gear teeth are damaged.

## Starter Field Winding Test

1. Check for continuity between the brushes. If there is no continuity, replace the armature housing.
2. Check for continuity between each brush and the armature housing (ground). If continuity exists, replace the armature housing.

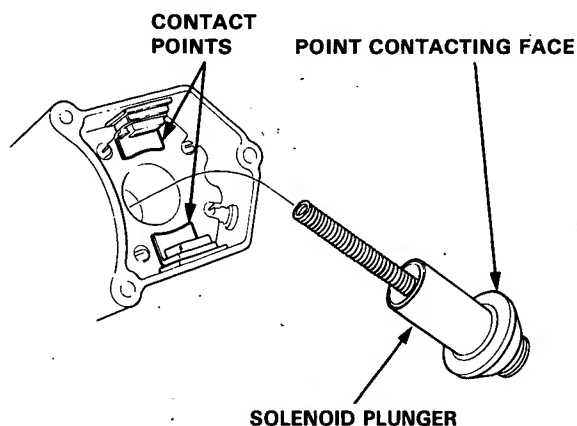






## Solenoid Plunger Inspection

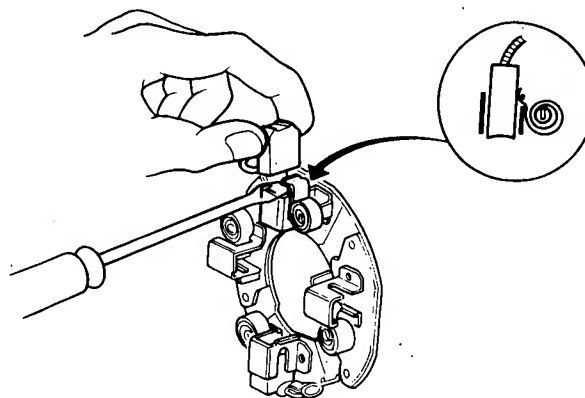
Check the contact points and face of the starter solenoid plunger for burning, pitting or any other defects. If surfaces are rough, recondition them with a strip of # 500 or # 600 sandpaper.



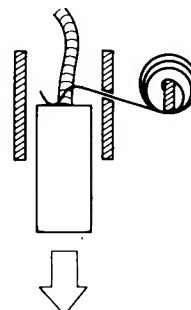
## Starter Reassembly

Reassemble the starter in the reverse order of disassembly.

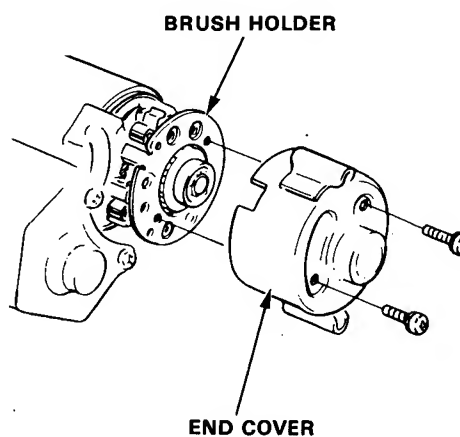
1. Pry back each brush spring with a screwdriver, then position the brush about halfway out of its holder, and release the spring to hold it there.



2. Install the armature in the housing. Next pry back each brush spring again and push the brush down until it seats against the commutator, then release the spring against the end of the brush.



3. Install the end cover on the brush holder.



# Starting System

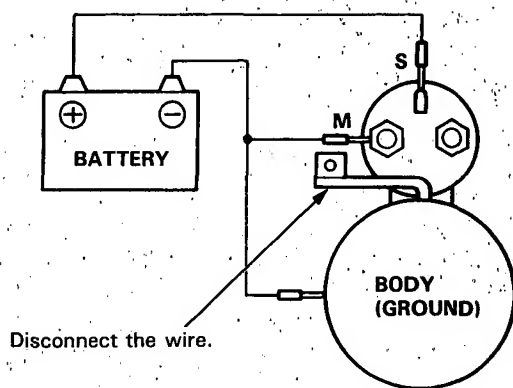
## Performance Test

**NOTE:** Before starting the following checks, disconnect the wire from terminal M, and make a connection as described below using as heavy a wire as possible (preferably equivalent to the wire used for the car).

### Pull-in Coil Test:

Connect the battery as shown. If the pinion protrudes, it is working properly.

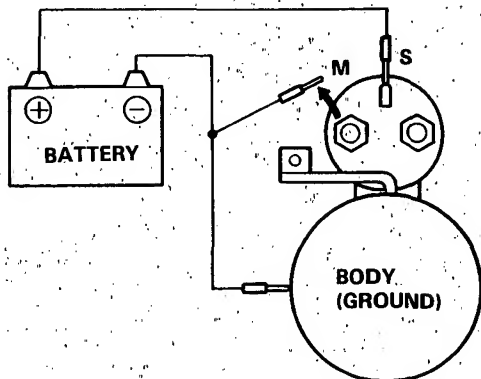
**NOTE:** Do not leave the battery connected for more than 10 seconds.



### Hold-in Coil Test:

Disconnect the battery from the M terminal. If the pinion does not snap back, the hold-in coil is working properly.

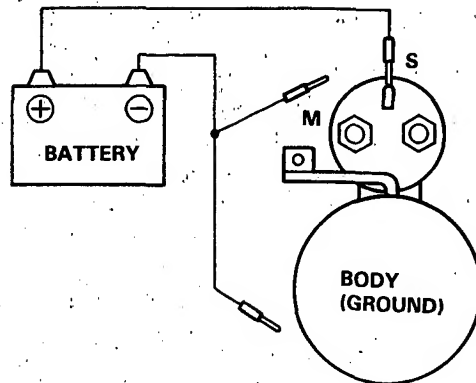
**NOTE:** Do not leave the battery connected for more than 10 seconds.



### Retracting Test:

Disconnect the battery also from the body. If the pinion retracts immediately, it is working properly.

**NOTE:** Do not leave the battery connected for more than 10 seconds.



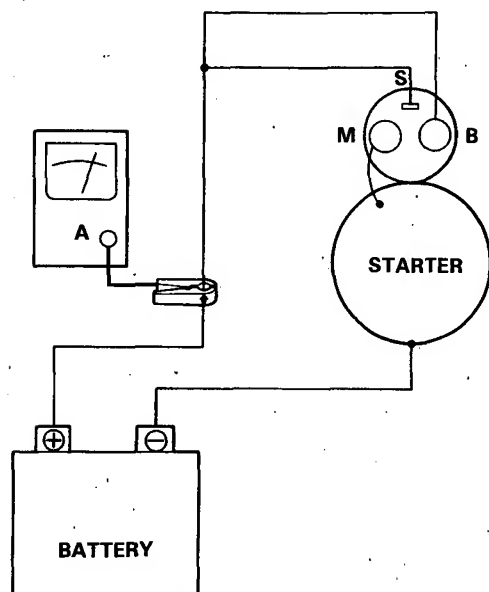


**Starter No-load Test:**

1. Clamp the starter firmly in a vise.
2. Connect the starter to the battery as described in the diagram below and confirm that the motor starts and keeps rotating.
3. If the electric current and motor speed meet the specifications when the battery voltage is at 11 V, the starter is working properly.

**Specifications:**

90 A or less (electric current),  
3000 rpm or more (motor speed)



# Ignition System

## Component Location Index

### IGNITION TIMING CONTROL SYSTEM

Description, page 23-77

Troubleshooting, section 11

Inspection and Setting, page 23-79

### DISTRIBUTOR

Top End Inspection, page 23-83

Removal/Installation, page 23-83 and 84

Overhaul, page 23-85

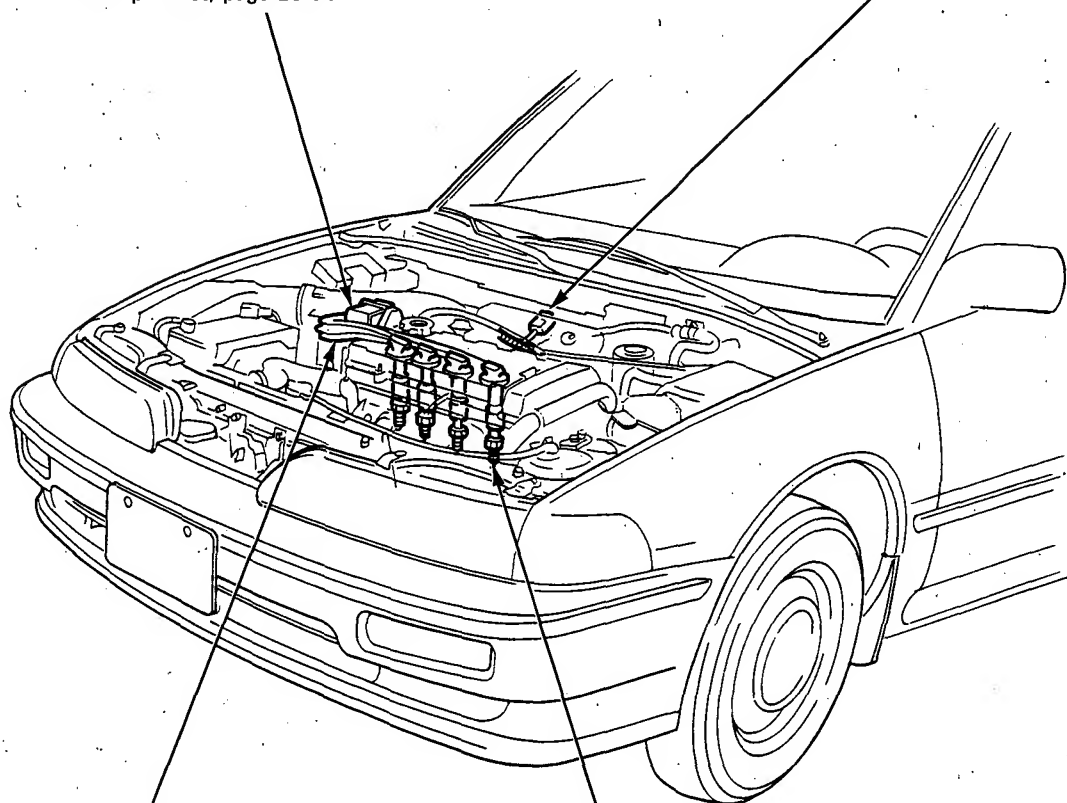
Ignition Coil Test/Replacement, page 23-81 and 82

Ignition Control Module (ICM) Troubleshooting, section 11

ICM Input test, page 23-80

### SERVICE CHECK CONNECTOR

(Located under the blower motor)



### IGNITION WIRES

Inspection and Test, page 23-86

### SPARK PLUG

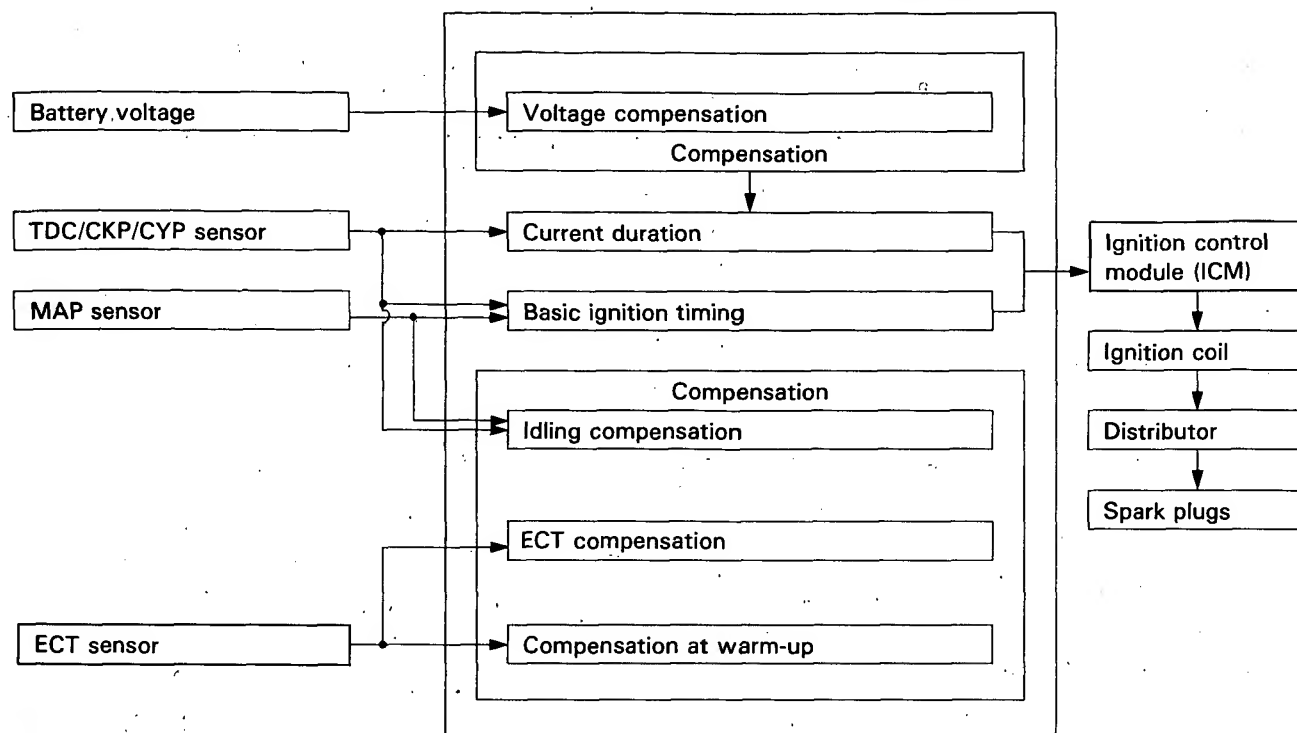
Inspection, page 23-87 and 88



## Description

### Ignition Timing Control:

The programmed ignition system (PGM-IG) on this engine provides optimum control of ignition timing. A microcomputer determines the timing based on information about engine speed and intake manifold vacuum, which is transmitted by signals from the TDC/CKP/CYP sensor, throttle position (TP) sensor, engine coolant temperature (ECT) sensor, and MAP sensor. This system, not dependent on a governor or vacuum diaphragm, is capable of setting lead angles with complicated characteristics which cannot be provided by conventional governors or diaphragms.



### Basic Control

Determination of ignition timing and current duration:

The control module has stored within it the optimum basic ignition timing for operating conditions based upon engine speed and intake manifold vacuum. With compensation by signals from sensors, the system determines optimum timing for ambient conditions and sends voltage pulses to the ICM.

Compensation of ignition timing:

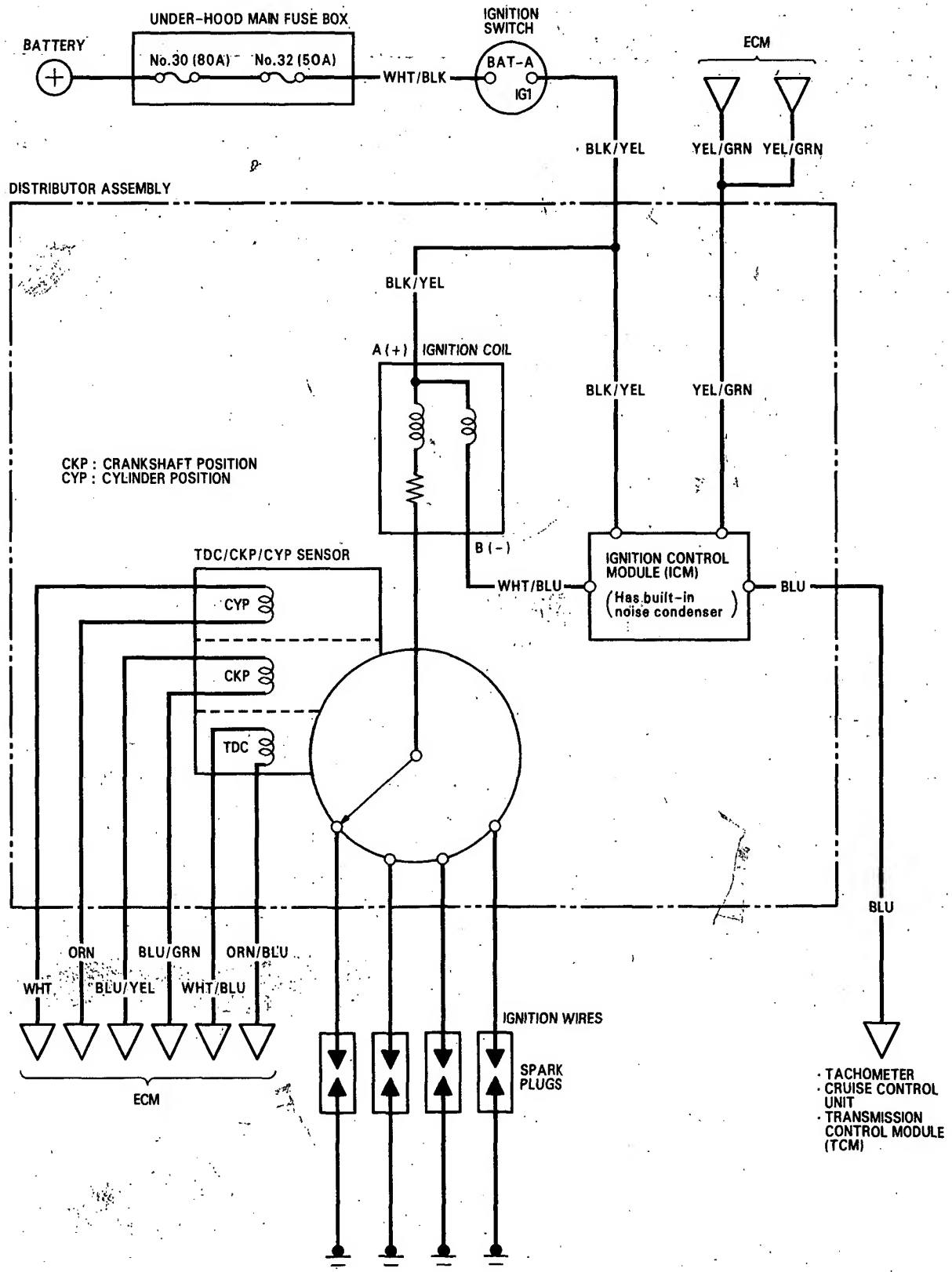
Compensation Item	Related Sensor and Information	Description
Idling	TDC/CKP/CYP sensor MAP sensor	Ignition timing is controlled to the target speed with compensation according to the idle speed.
Compensation at warm-up	ECT sensor	Lag angle is adjusted in accordance with warm-up conditions to bring about a good balance between operating performance and exhaust gas level.
ECT compensation	ECT sensor	Compensation for lead angle at a low ECT and lag angle at high ECT.

### Control at Start

Ignition timing is fixed at BTDC 7° for cranking. The cranking is detected by the TDC sensor (cranking revolution) and starter signal.

# Ignition System

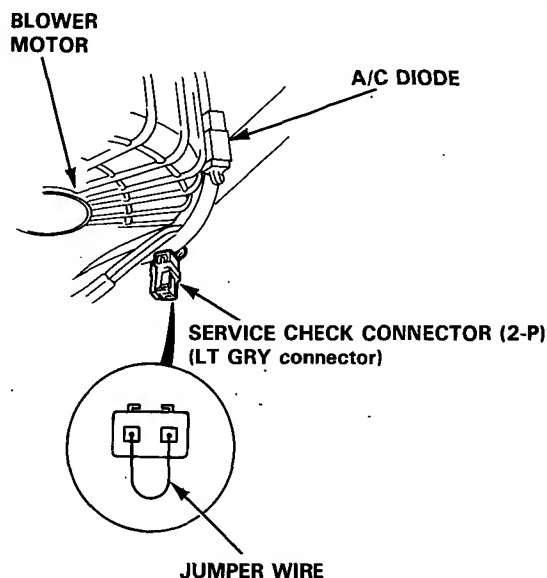
## Circuit Diagram



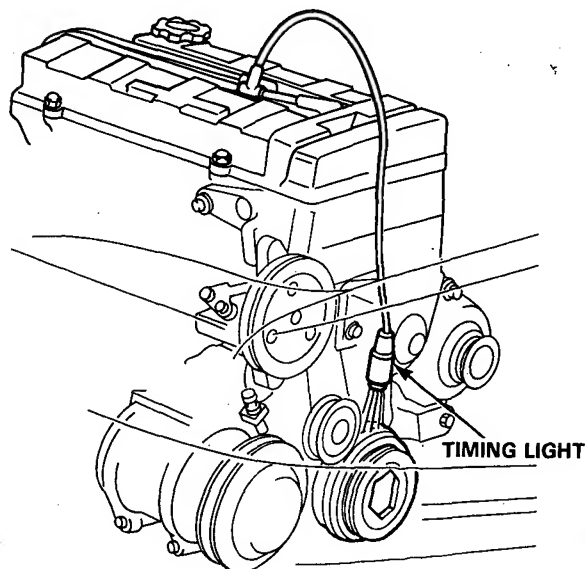


## Ignition Timing Inspection and Setting

1. Start the engine and allow it to warm up (the cooling fan comes on.)
2. Pull out the service check connector located under the right side of the dash. Connect the GRN/WHT and BRN terminals with a jumper wire.



3. Connect a timing light to the #1 ignition wire and point it toward the pointer on the timing belt cover.



4. Adjust ignition timing, if necessary, to the following specifications:

### Ignition Timing:

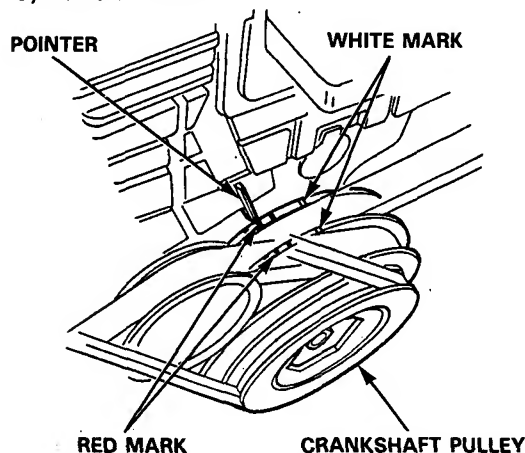
#### B18A1 Engine

$16^{\circ} \pm 2^{\circ}$  BTDC (RED) at  $750 \pm 50$  rpm

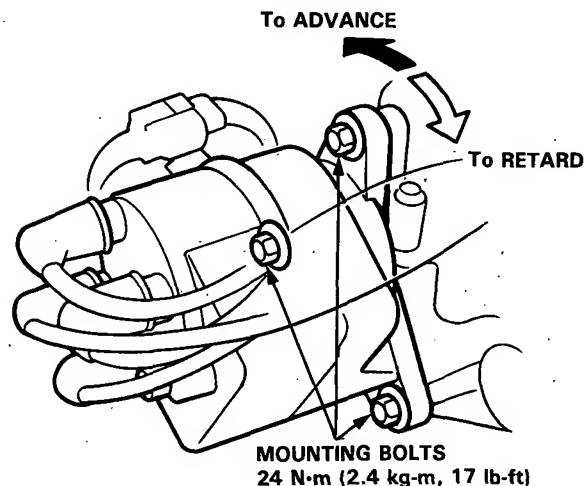
#### B17A1 Engine

$16^{\circ} \pm 2^{\circ}$  BTDC (RED) at  $800 \pm 50$  rpm

NOTE: Shift lever in neutral position, all electrical systems turned OFF.



5. If it is necessary to adjust the ignition timing, loosen the distributor mounting bolts, and turn the distributor housing counter-clockwise to advance the timing, or clockwise to retard the timing.



6. Tighten the adjusting bolts and recheck the timing.
7. Remove the jumper wire from the service check connector.

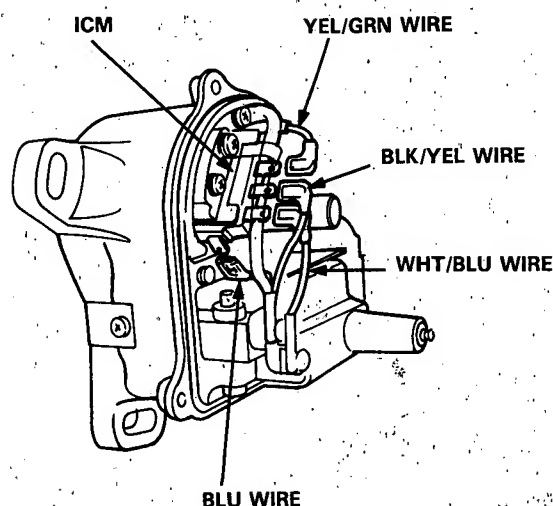
# Ignition System

## Ignition Control Module (ICM) Input Test

### NOTE:

- See section 11 when the malfunction indicator light (MIL).
- Perform an input test for the ignition control module (ICM) after finishing the fundamental tests for the ignition system and the fuel and emission system.
- The tachometer should operate normally.

1. Remove the distributor cap, the rotor, and the inner cover.
2. Disconnect the BLK/YEL, WHT/BLU, YEL/GRN, and BLU wires from the ICM.



3. Turn the ignition switch ON. Check for voltage between the BLK/YEL wire and body ground. There should be battery voltage.
  - If there is no battery voltage, check the BLK/YEL wire between the ignition switch and the ICM.
  - If there is battery voltage, go to step 4.
4. Turn the ignition switch ON. Check for voltage between the WHT/BLU wire and body ground. There should be battery voltage.
  - If there is no battery voltage, check the:
    - Ignition coil.
    - WHT/BLU wire between the ignition coil and the ICM.
  - If there is battery voltage, go to step 5.

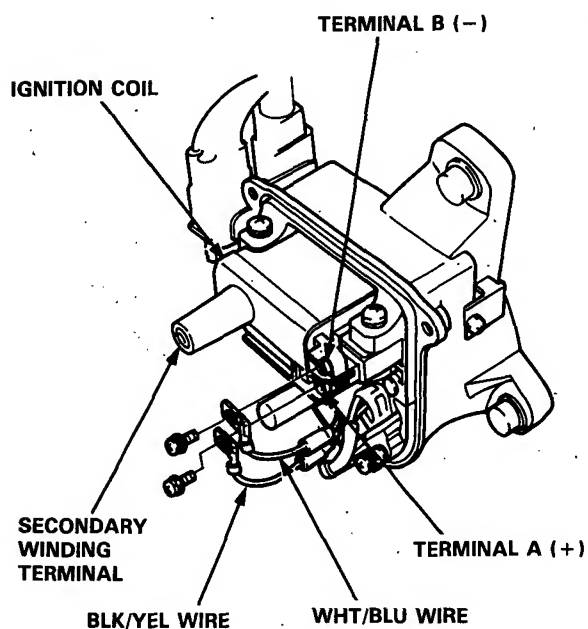
5. Check the YEL/GRN wire between the ECM and the ICM.
6. Check the BLU wire between the tachometer and the ICM.
7. If all tests are normal, replace the ICM.





## Ignition Coil Test

1. With the ignition switch OFF, remove the distributor cap.
2. Remove the two screws to disconnect the BLK/YEL and WHT/BLU wires from the terminals A (+) and B (-) respectively.

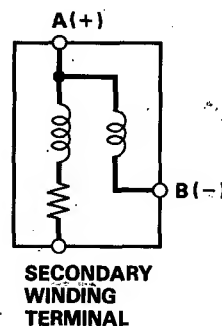


3. Using an ohmmeter, measure resistance between the terminals. Replace the coil if the resistance is not within specifications.

NOTE: Resistance will vary with the coil temperature; specifications are at 68°F (20°C).

**Primary Winding Resistance**  
(between the A and B terminals):  
0.6–0.8 ohms

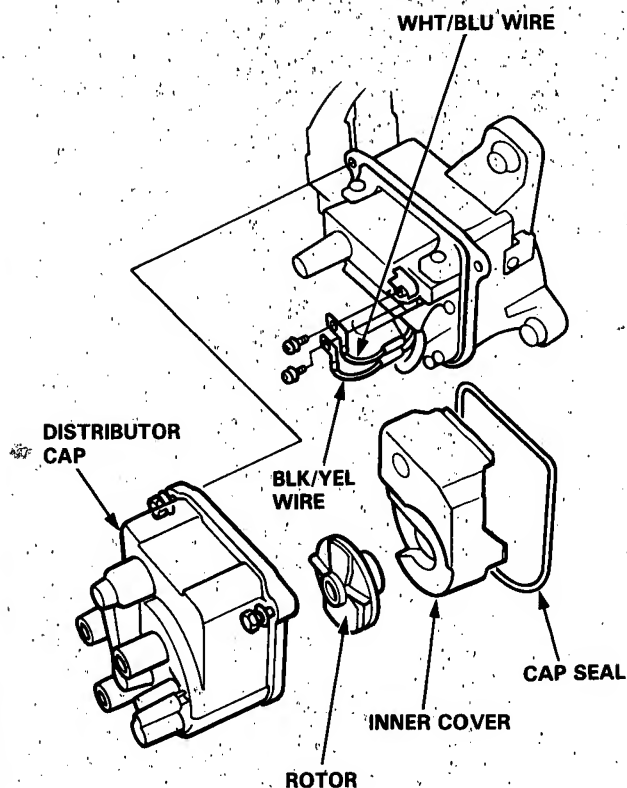
**Secondary Winding Resistance**  
(between the A and secondary winding terminals):  
12,800–19,200 ohms



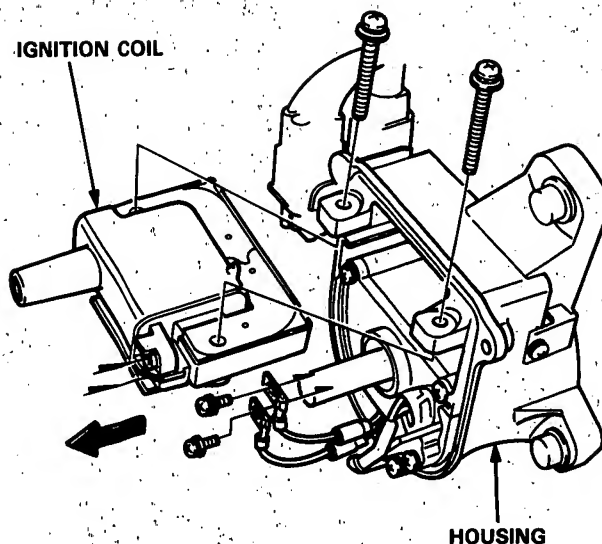
# Ignition System

## Ignition Coil Replacement

1. With the ignition switch OFF, remove the distributor cap, rotor, and cap seal, then remove the inner cover.



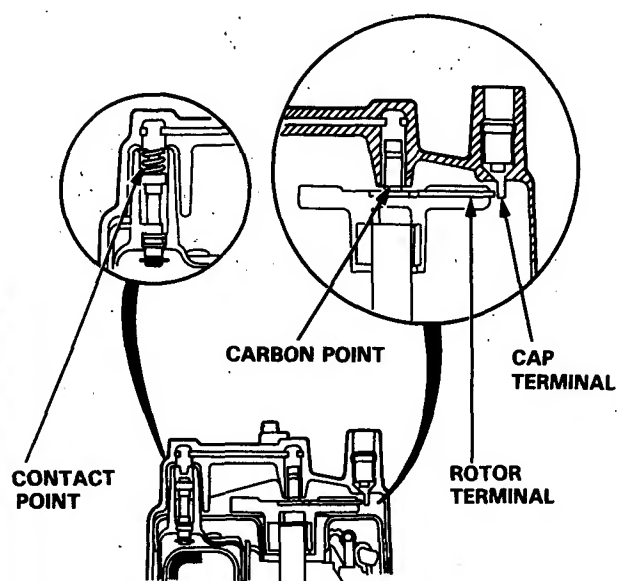
2. Remove the two screws to disconnect the BLK/YEL and WHT/BLU wires from the terminals.
3. Remove the two screws and slide the ignition coil out of the distributor housing.





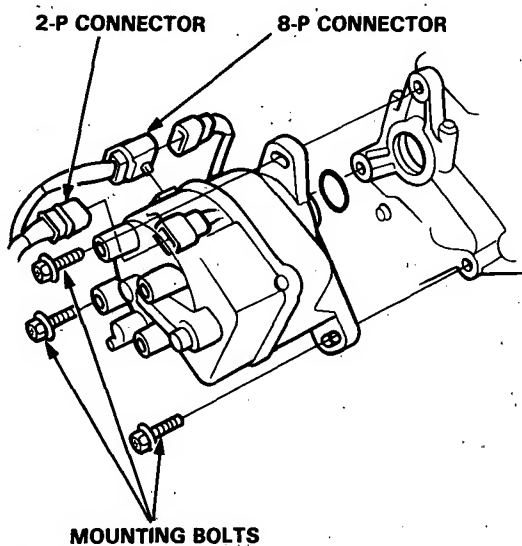
## Distributor Top End Inspection

1. Check for rough or pitted rotor and cap terminals.
2. Scrape or file off the carbon deposits. Smooth the rotor terminal with an oil stone or #600 sandpaper if rough.
3. Check the distributor cap for cracks, wear, and damage. If necessary, clean or replace it.



## Distributor Removal

1. Disconnect the 2-P and 8-P connectors from the distributor.
2. Disconnect the plug wires from the distributor cap.



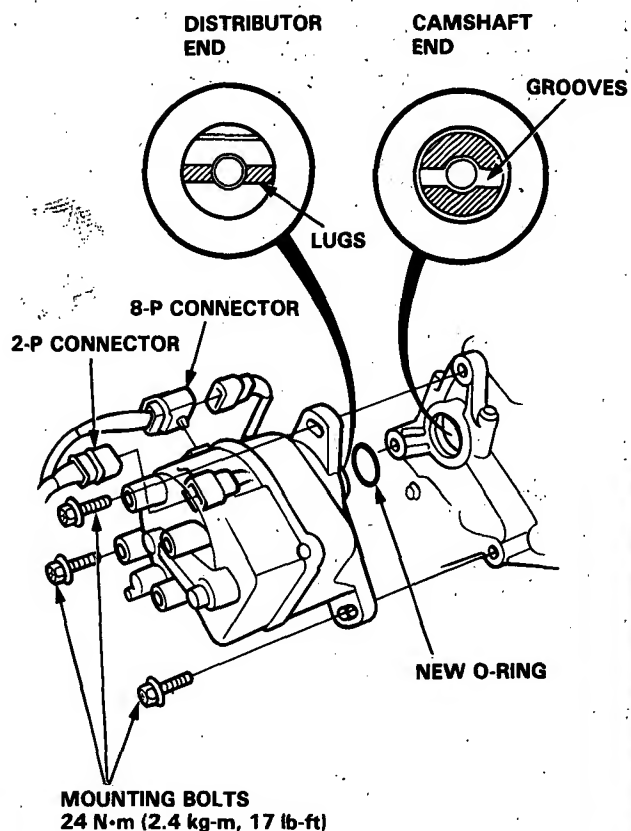
3. Remove the distributor mounting bolts, then remove the distributor from the cylinder head.

# Ignition System

## Distributor Installation

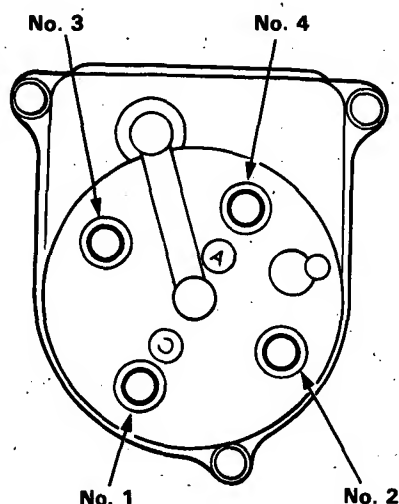
1. Coat a new O-ring with engine oil, then install it.
2. Slip the distributor into position.

**NOTE:** The lugs on the end of the distributor and its mating grooves in the camshaft end are both offset to eliminate the possibility of installing the distributor 180° out of time.



3. Install the mounting bolts and tighten them temporarily.
4. Connect the 2-P and 8-P connectors to the distributor.

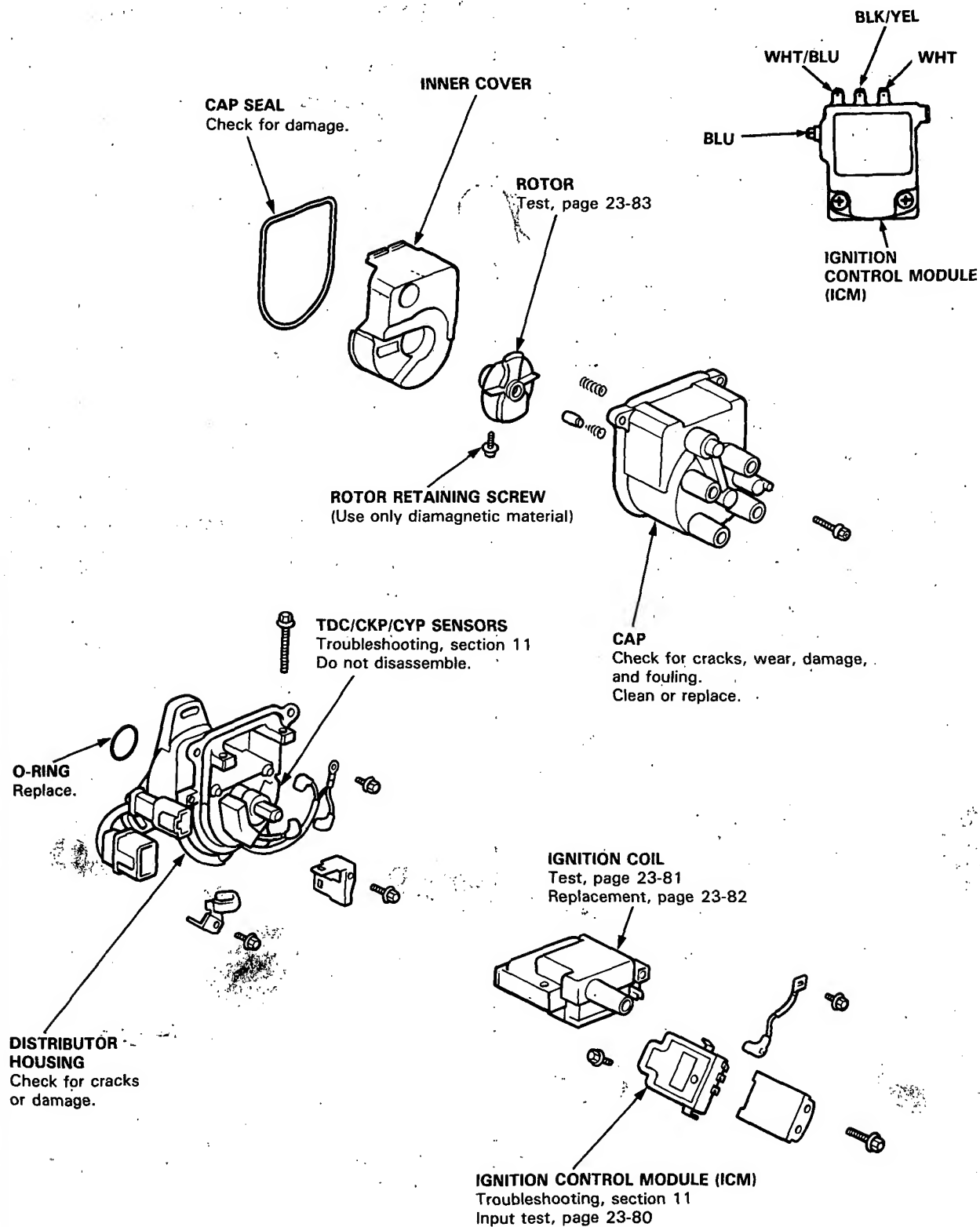
5. Connect the ignition wires as shown.



6. Set the timing with a timing light (see page 23-79).
7. After setting the timing, tighten the mounting bolts.



## Distributor Overhaul

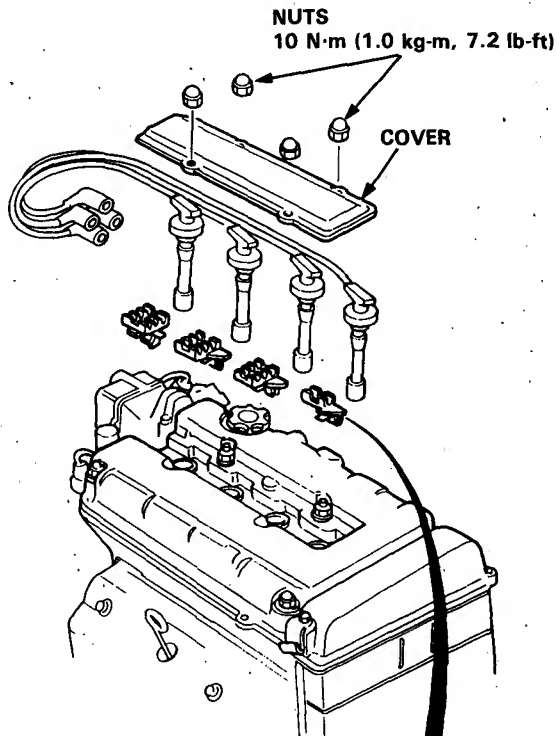


# Ignition System

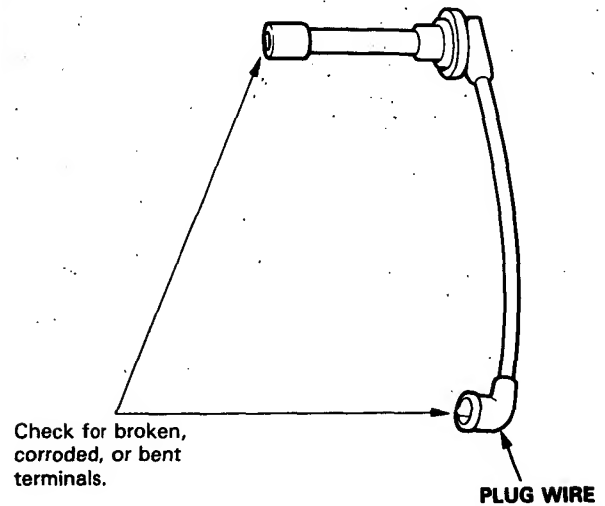
## Ignition Wire Inspection and Test

**CAUTION:** Carefully remove the ignition wires by pulling on the rubber boots. Do not bend the wires as you might break them inside.

1. Remove the four nuts, then remove the cover (B17A1 engine).

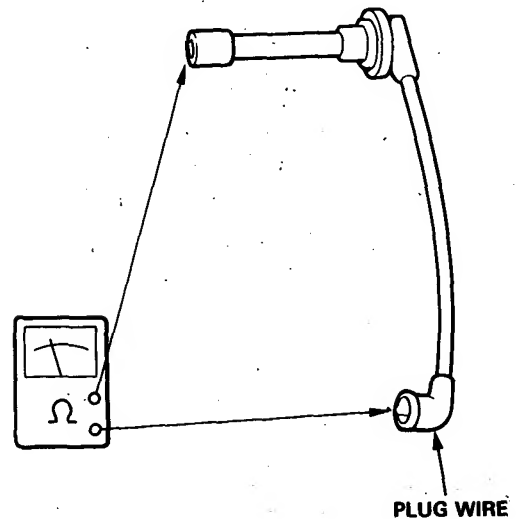


2. Check the condition of the wire terminals. If any of them is corroded, clean it, and if it is broken or distorted, replace the wire.



3. Connect ohmmeter probes and measure resistance.

Ignition Wire Resistance:  
25,000 ohms max. at 68°F (20°C)

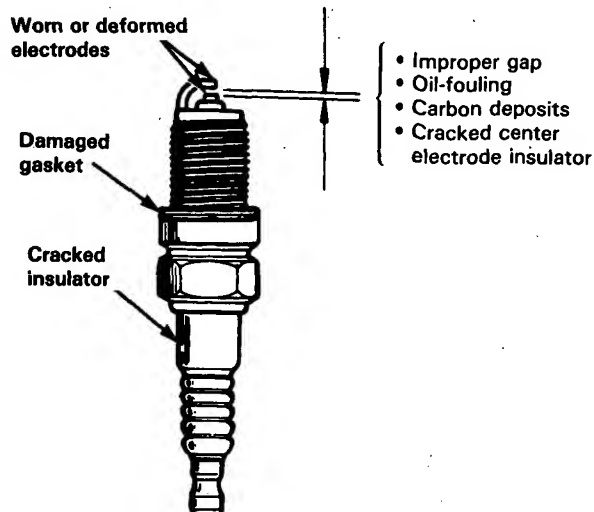


4. If resistance exceeds 25,000 ohms, replace the ignition wire.



## Spark Plug Inspection (B18A1 Engine)

1. Inspect the electrodes and ceramic insulator for:



**Burned or worn electrodes may be caused by:**

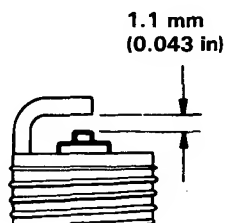
- Advanced ignition timing
- Loose spark plug
- Too low plug heat range
- Insufficient cooling

**Fouled plug may be caused by:**

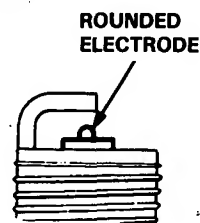
- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Too high plug heat range
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil or ignition wires

2. Adjust the gap with a suitable gapping tool.

**Electrode Gap: 1.1 mm (0.043 in)**



3. Replace the plug if the center electrode is rounded as shown below:



**Spark Plug:**

ZFR5F-11 (NGK) KJ16CR-L11 (Nippondenso)	For all normal driving.
ZFR6F-11 (NGK) KJ20CR-L11 (Nippondenso)	For hot climates or continuous high speed driving.

4. Apply a small quantity of anti-seize compound to the plug threads before installing the plugs.
5. Screw the plugs into the cylinder head finger-tight, then torque them to 18 N·m (1.8 kg-m, 13 lb-ft).

# Ignition System

## Spark Plug Inspection (B17A1 Engine)

1. Inspect the electrodes and ceramic insulator for:

Worn or deformed electrodes

Damaged gasket

Cracked insulator

- Improper gap
- Oil-fouling
- Carbon deposits
- Cracked center electrode insulator

Burned or worn electrodes may be caused by:

- Advanced ignition timing
- Loose spark plug
- Plug heat range too low
- Insufficient cooling

Fouled plug may be caused by:

- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil

2. Replace the plug if it is fouled or worn.

NOTE: Do not use spark plugs other than those listed below.

### Spark Plug:

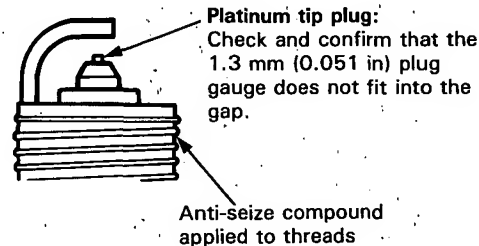
PFR6G-13 (NGK)  
PK20PR-L13  
(Nippondenso)

For all normal driving.

3. Make sure that the 1.3 mm (0.051 in) plug gauge does not go into the gap for the platinum tip plug. If the gauge goes into the gap, do not attempt to adjust the side electrode; replace the plug with a new one.

### Electrode Gap:

Standard	1.0 mm – 1.1 mm (0.039 in – 0.043 in)
Service Limit	1.3 mm (0.051 in)



4. Screw the plugs into the cylinder head fingertight, then torque them to 18 N·m (1.8 kg·m, 13 lb·ft).

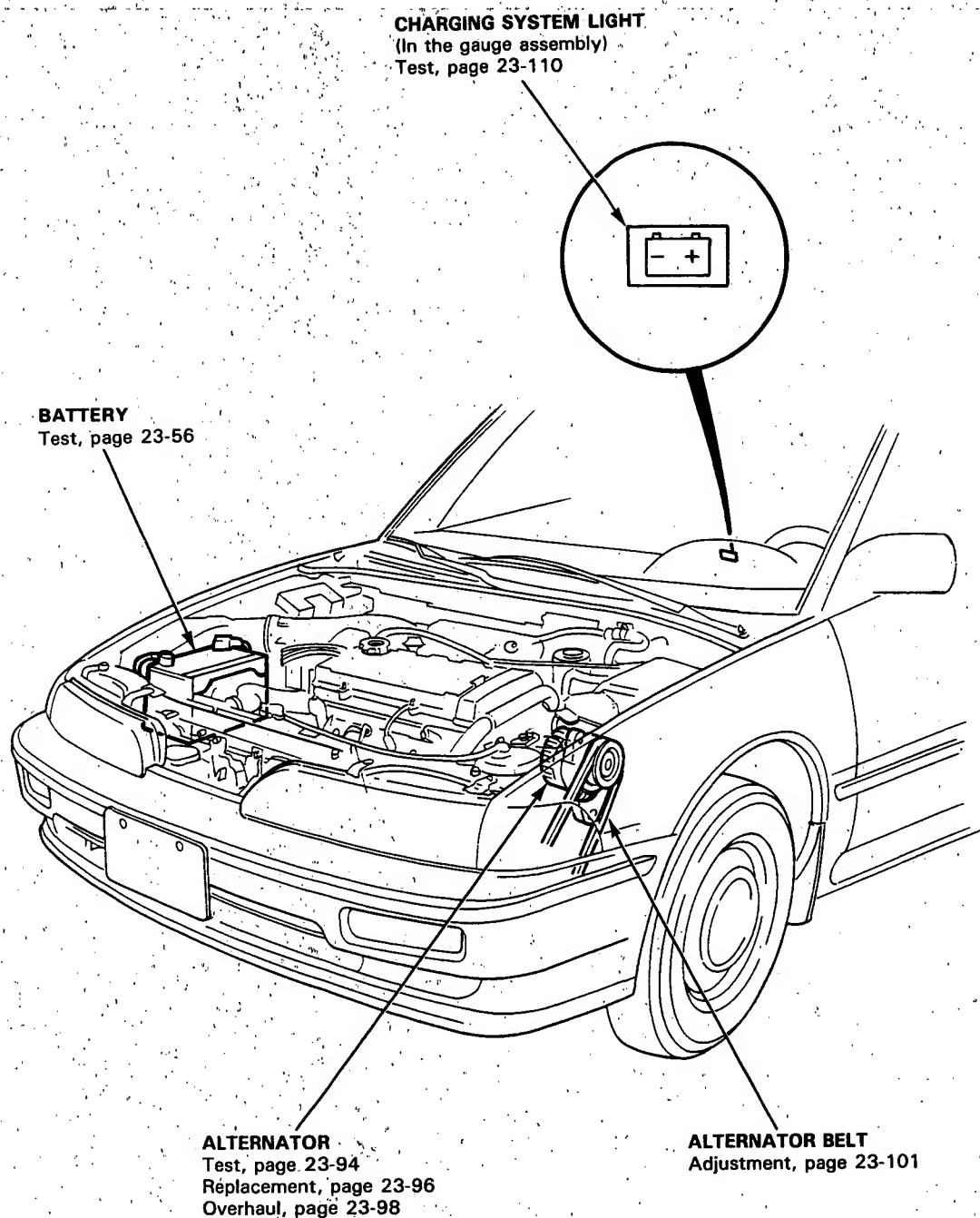
NOTE: Apply a small quantity of anti-seize compound to the plug threads before installing each plug.





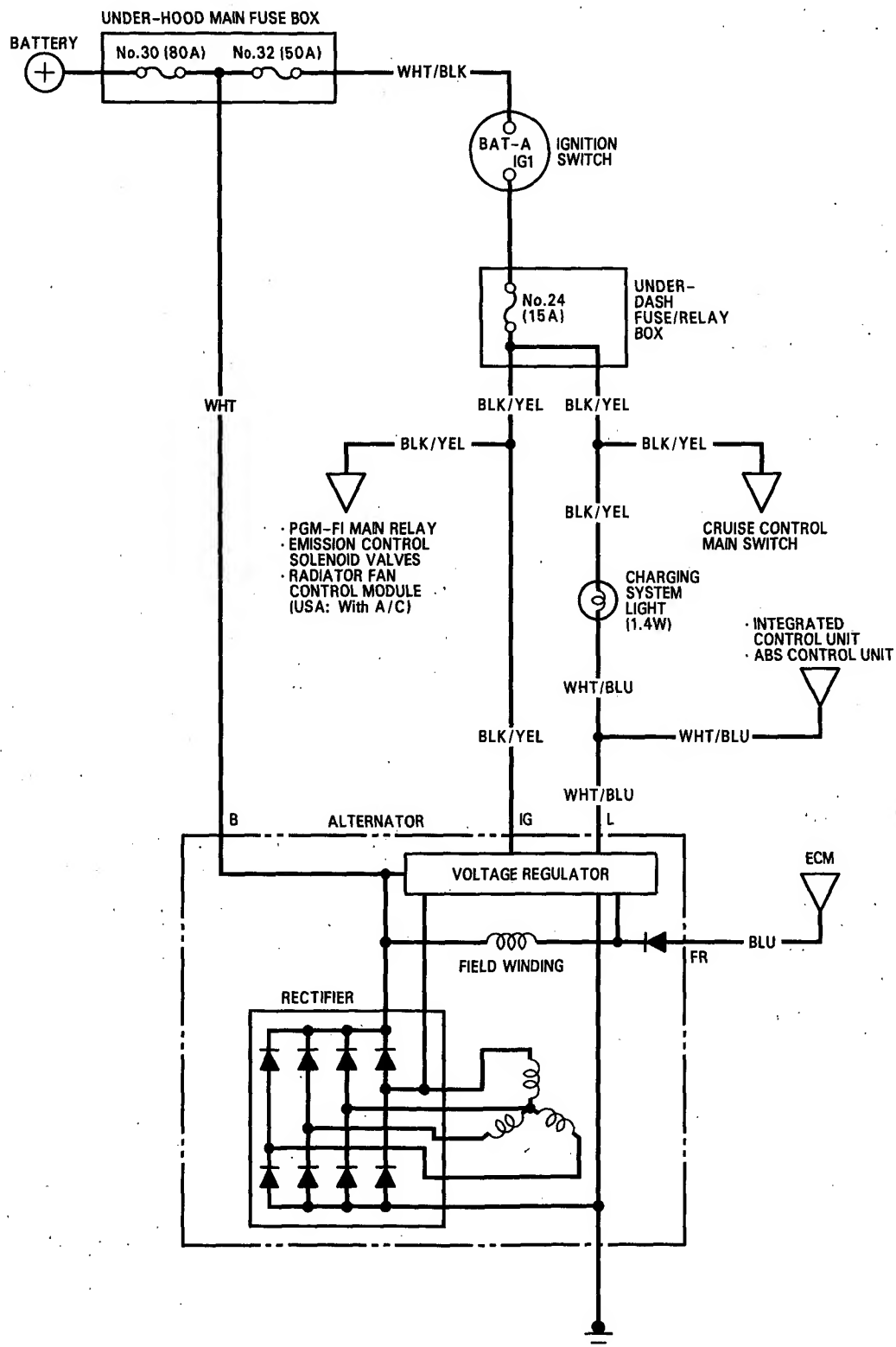
# Charging System

## Component Location Index





## Circuit Diagram



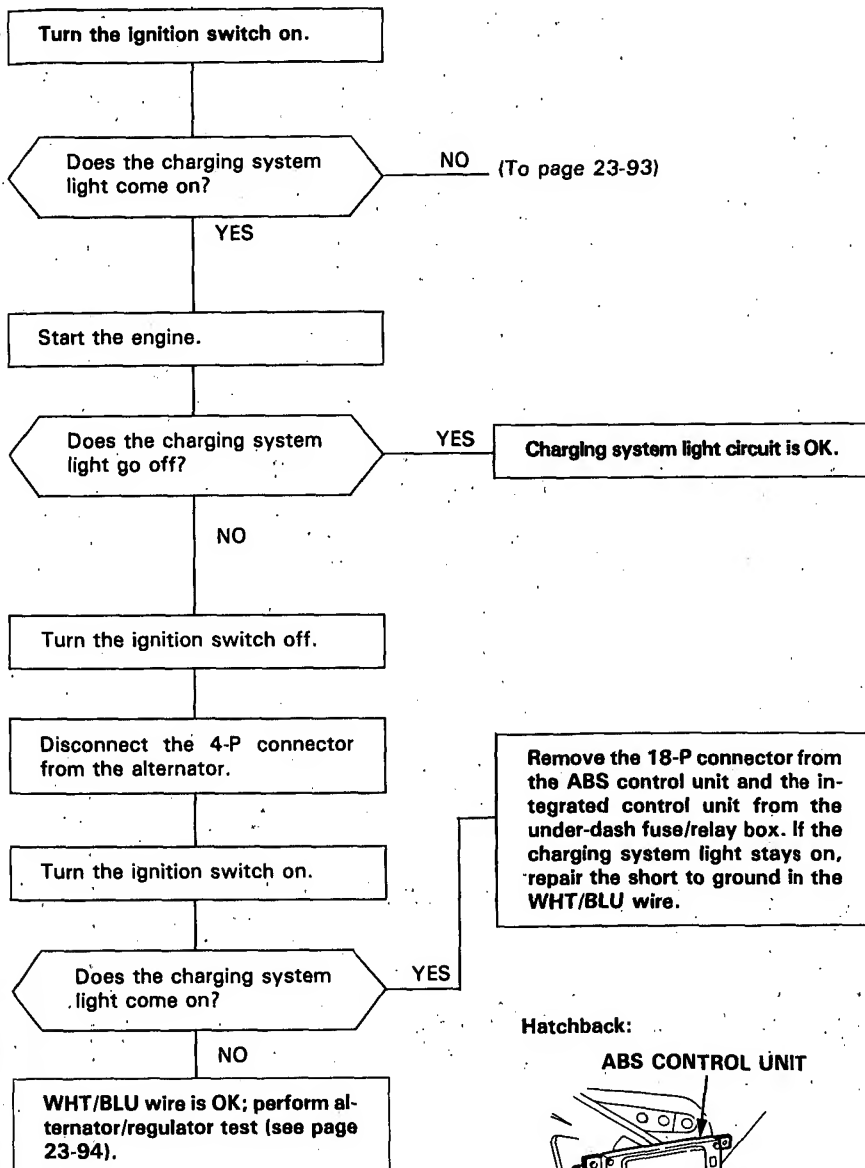
# Charging System

## Troubleshooting

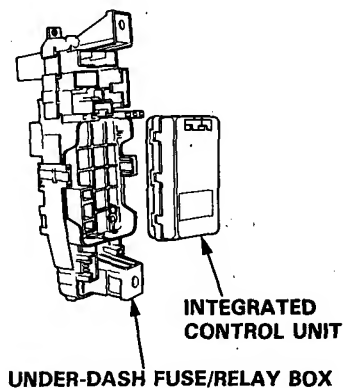
If the charging system light is on, or the battery is dead or low, perform the following tests in the order listed below:

1. Battery Test (see page 23-56)
2. Charging System Light Operation Test
3. Alternator/Regulator Test

### Charging System Light Operation Test

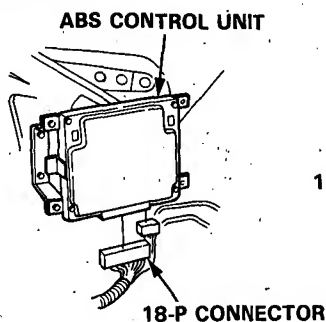


NOTE: Do not disconnect all of the connectors on the under-dash fuse/relay box.

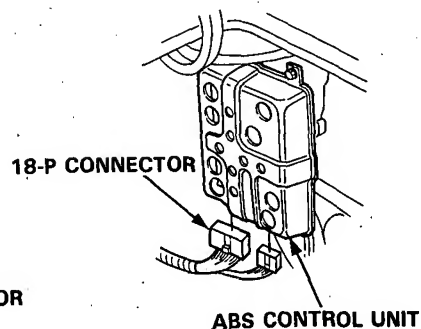


NOTE: After this test or related repairs, reconnect the control unit connectors, then reset the ECM to clear any codes.

Hatchback:



Sedan:





(From page 23-92)

Turn the ignition switch off.

Check fuse No. 24 (15 A) in the under-dash fuse/relay box.

Is the fuse OK?

NO

Replace the fuse.

YES

Disconnect the 4-P connector from the alternator.

Turn the ignition switch on.

Check for voltage at the IG terminal (BLK/YEL wire) of the 4-P connector.

Is there battery voltage?

NO

Repair open in the BLK/YEL wire.

YES

Ground the WHT/BLU wire at the L terminal of the 4-P connector.

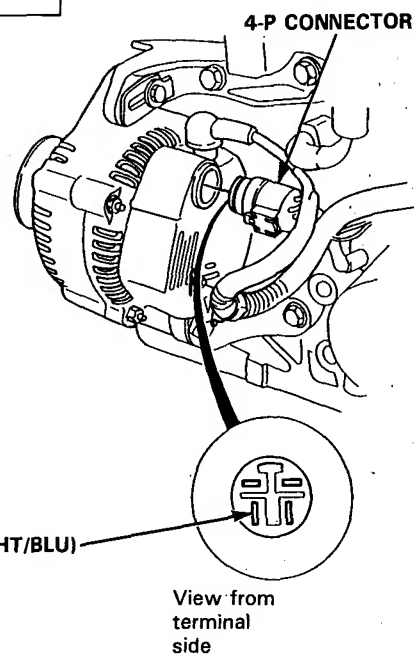
Does the charging system light come on?

NO

Check for a blown charging system light bulb. If the bulb is OK, repair open in the WHT/BLU wire.

YES

Replace the voltage regulator.



(cont'd)

# Charging System

## Troubleshooting (cont'd)

### Alternator/Regulator Test

NOTE: Be sure the battery is sufficiently charged (see page 23-56).

Connect the Sun VAT-40 (or equivalent) and turn the selector switch to position 1 (starting).

Start the engine and let it idle until it reaches normal operating temperature.

Raise the engine speed to 2000 rpm and hold it there.

Is the voltage over 15.1V?

NO

Release the accelerator pedal and let the engine idle.

Make sure all accessories are turned off. Turn the selector switch to position 2 (charging).

Remove the inductive pick-up and zero the ammeter.

Place the inductive pick-up over the B terminal wire of the alternator so that the arrow points away from the alternator.

Raise the engine speed to 2000 rpm and hold it there.

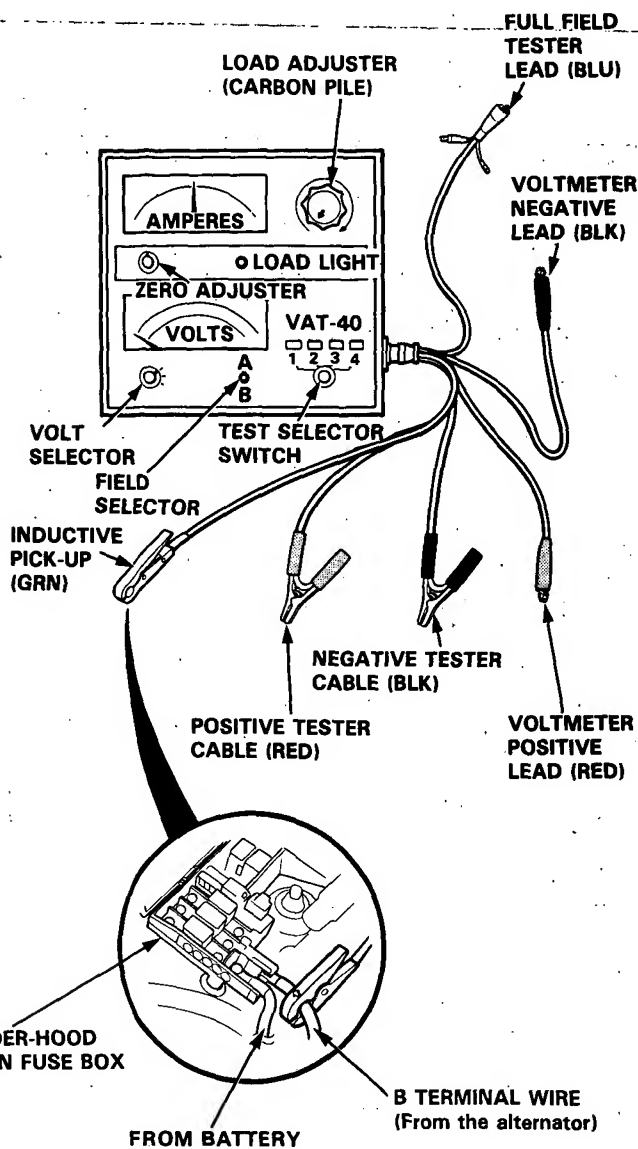
Is the voltage less than 13.9V?

NO

(To page 23-95)

Test the battery (see page 23-56).

Replace the voltage regulator.





(From page 23-94)

Apply a load with the VAT-40 until the battery voltage drops to between 12–13.5 V.

Is the amperage 40 A or more?

YES

Charging system is OK.

NO

With the engine speed still at 2000 rpm, full-field the alternator.

Is the alternator output 40 A or more?

NO

Test and repair the alternator components (see pages 23-96 to 23-100).

YES

Turn the ignition switch off.

Turn the ignition switch on.

Disconnect the 4-P connector from the alternator.

Check for voltage at the IG terminal (BLK/YEL) of the 4-P connector.

Is there battery voltage?

NO

Repair open in the BLK/YEL wire.

YES

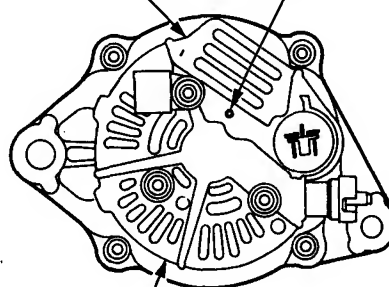
Replace the voltage regulator.

**NOTE:** Attach a probe to the VAT-40 full field test lead and insert the probe into the full field access hole at the back of the alternator. Switch the field selector to the "A (Ground)" position momentarily and check amperage reading.

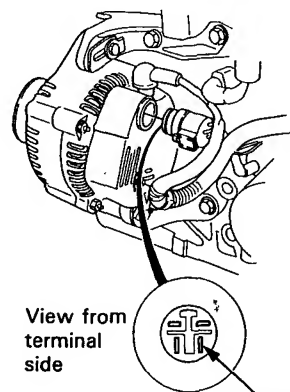
**CAUTION:** The voltage will rise quickly when the alternator is full-fielded. Do not allow the voltage to exceed 18V or it may damage the electrical system.

REGULATOR  
(Located inside the end cover)

FULL FIELD  
ACCESS HOLE



END COVER



View from  
terminal  
side

IG (BLK/YEL)

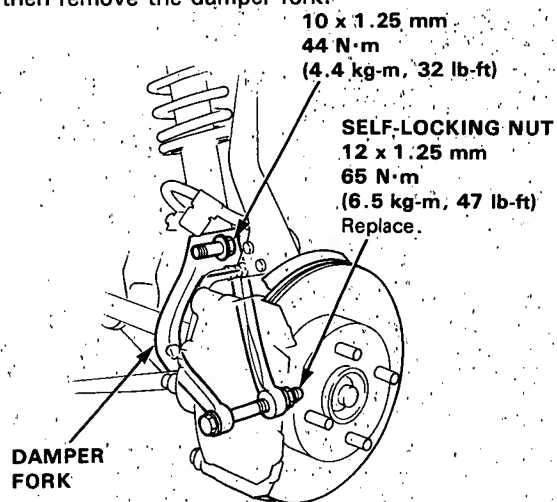
# Charging System

## Alternator Replacement

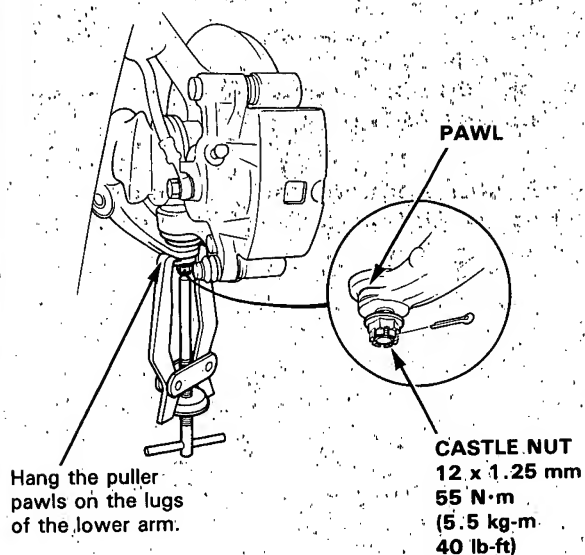
**NOTE:** To remove the alternator, first it is necessary to remove the left driveshaft.

### Driveshaft Removal:

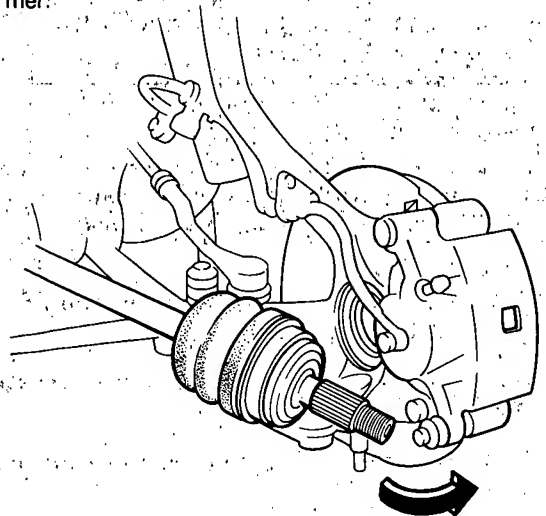
1. Loosen the left front wheel-lug nuts.
2. Raise the front end of the car and place safety stands under the proper locations. Remove the left front wheel.
3. Raise the locking tab on the spindle nut and remove it with a 36 mm (1-7/16 in) socket wrench.
4. Remove the damper fork nut and damper pinch bolt, then remove the damper fork.



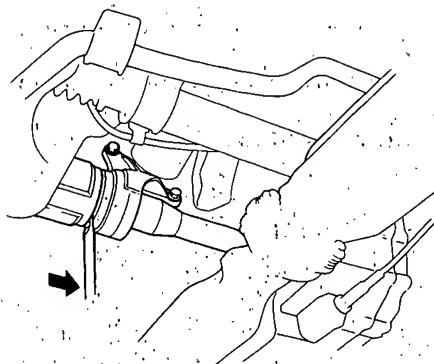
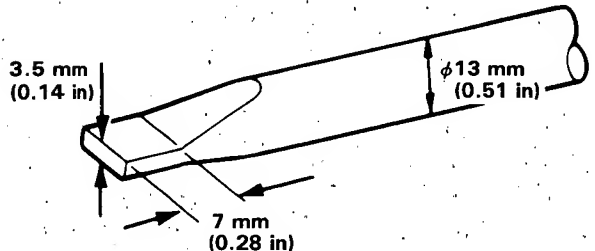
5. Remove the knuckle-to-lower arm castle nut, and separate the lower arm from the knuckle using a puller with the pawls applied to the lower arm.



6. Pull the knuckle outward and remove the driveshaft outboard joint from the knuckle using a plastic hammer.



7. Pry the driveshaft assembly with a screwdriver as shown to force the set ring at the driveshaft end past the groove.
8. Pull the inboard joint and remove the driveshaft and CV joint out of the intermediate shaft.



### CAUTION:

- Do not pull on the driveshaft, as the CV joint may come apart.
- Be careful when prying out the assembly and pull it straight to avoid damaging the intermediate shaft seals.





**NOTE:**

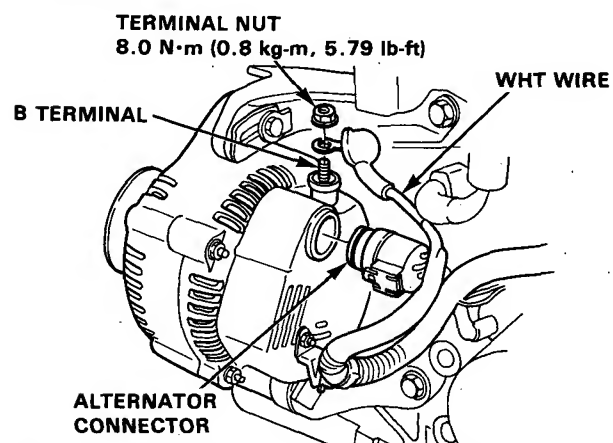
The radio may have a coded theft protection circuit. Be sure to get the customer's code number before

- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse. (in the under-dash fuse/relay box)
- Removing the radio.

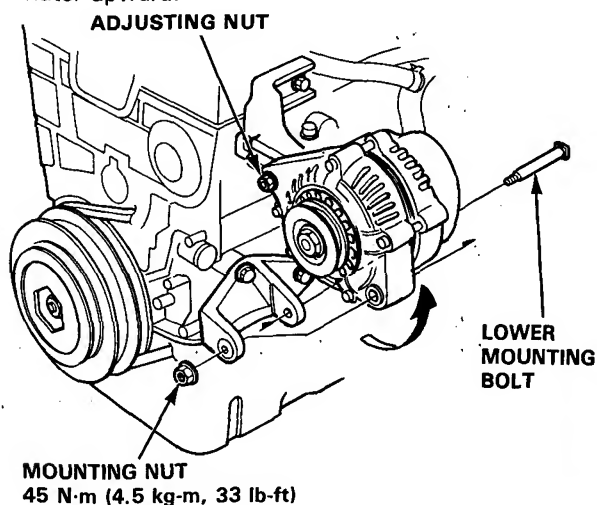
After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

**Alternator Removal:**

9. Disconnect the ground cable from the battery negative (-) terminal.
10. Disconnect the alternator connector from the alternator.
11. Remove the terminal nut and the WHT wire from the B terminal.

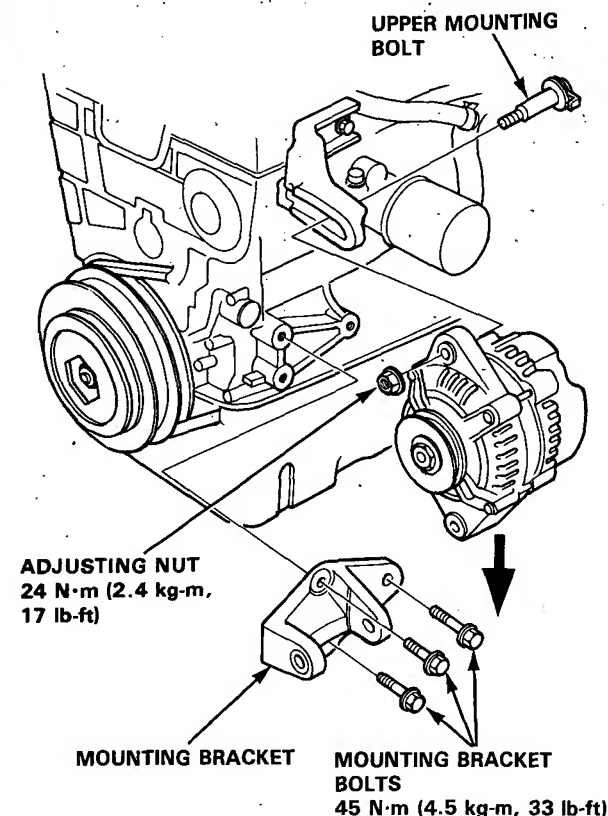


12. Loosen the adjusting nut, then remove the mounting nut.
13. Remove the alternator belt from the alternator pulley.
14. Remove the lower mounting bolt, then lift the alternator upward.



15. Remove the three mounting bracket bolts and mounting bracket.

16. Remove the adjusting nut and upper mounting bolt, then pull out the alternator.



17. Install the alternator in the reverse order of removal (driveshaft installation, see section 16).

**CAUTION:**

- Always use a new set ring whenever the driveshaft is being installed.
- Adjust the alternator belt tension after installation (see page 23-101).

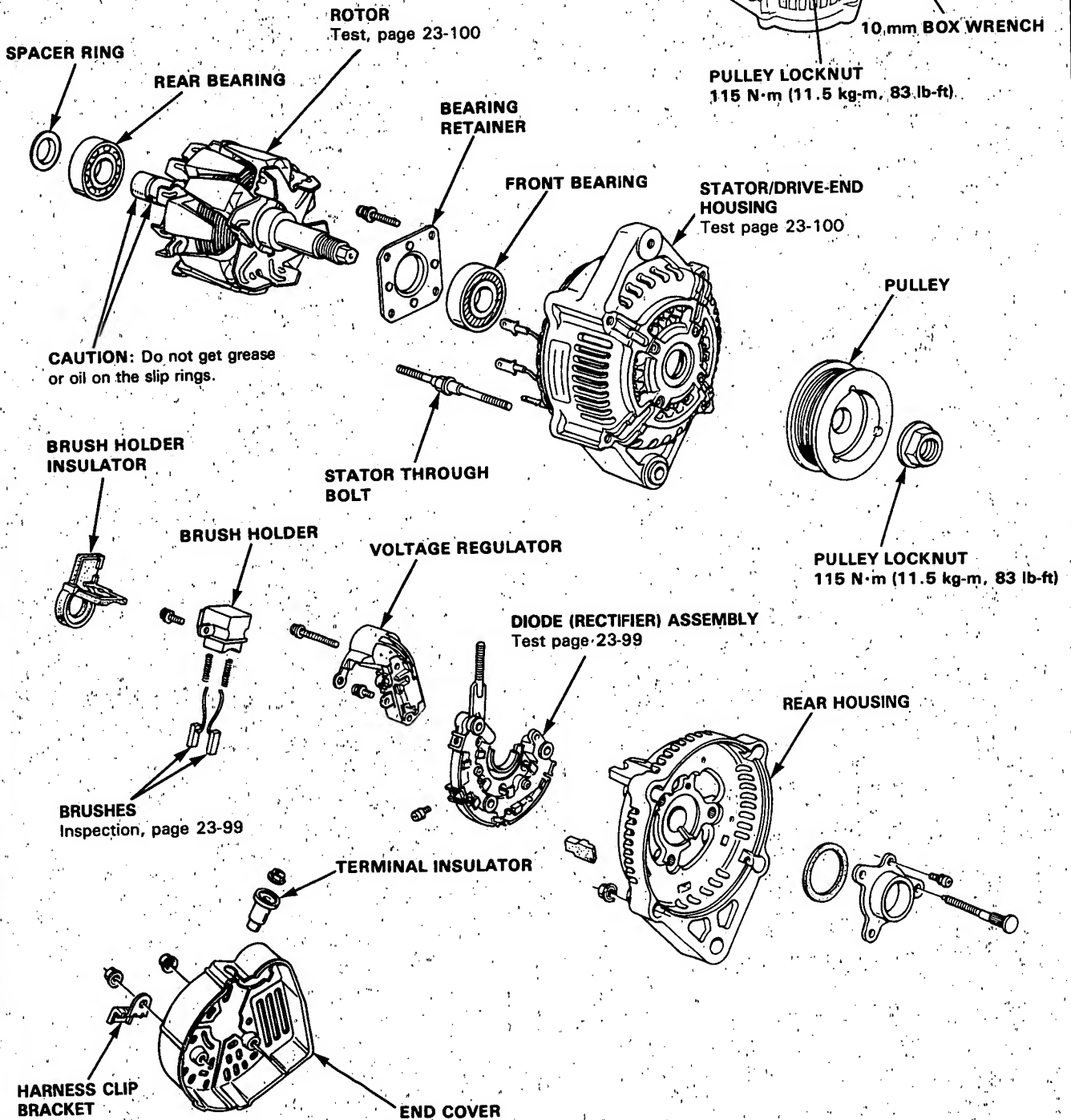
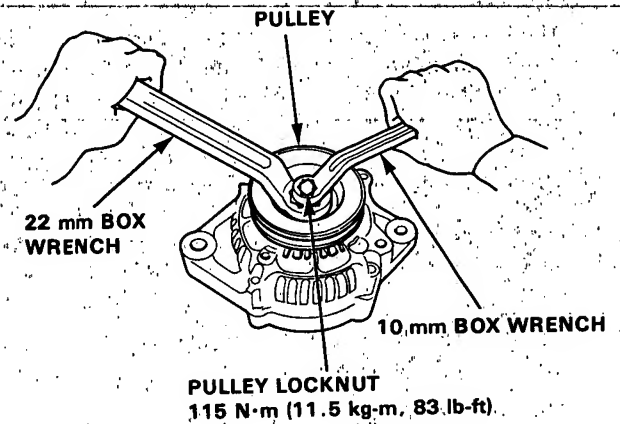
**NOTE:** After reconnecting battery ground cable and turning the radio ON, the word "CODE" will be displayed. Then enter the code.

# Charging System

## Alternator Overhaul

**NOTE:** Only if the front bearing needs replacement, it is necessary to separate the pulley, drive end housing, and rotor.

To loosen the pulley locknut, use 10 mm and 22 mm wrenches. If necessary, use an impact wrench.



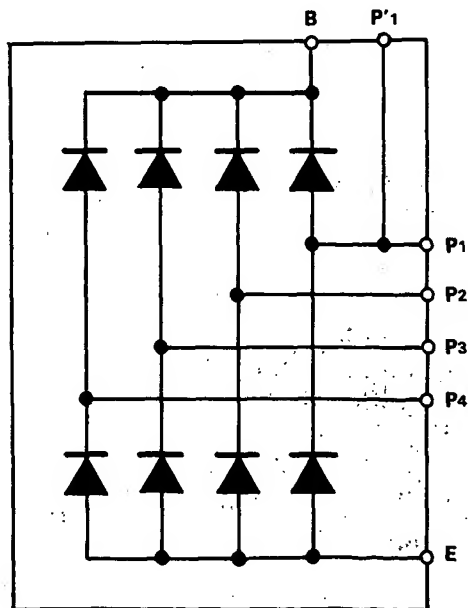
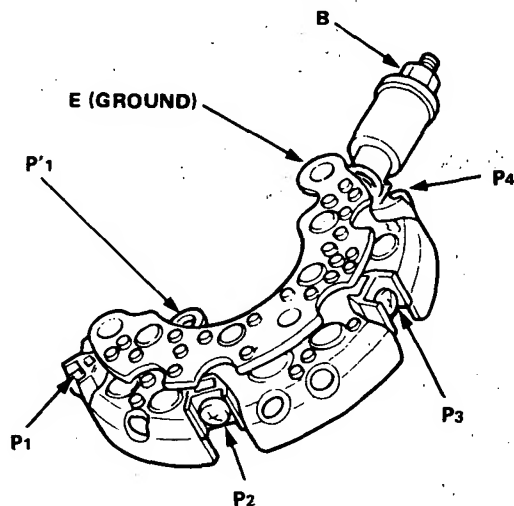


## Rectifier Test

### NOTE:

- The diodes are designed to allow current to pass in one direction while blocking it in the opposite direction. Each diode must be tested for continuity in both directions. Since the alternator rectifier is made up of eight diodes (four pairs), there are a total of 16 checks.
- Use an ohmmeter capable of checking diodes.

1. Check for continuity in each direction between the B and P terminals, and between the E (ground) and P terminals of each diode pair. All diodes should have continuity in only one direction.



2. If any of the eight diodes tests bad, replace the rectifier assembly (diodes are not available separately).

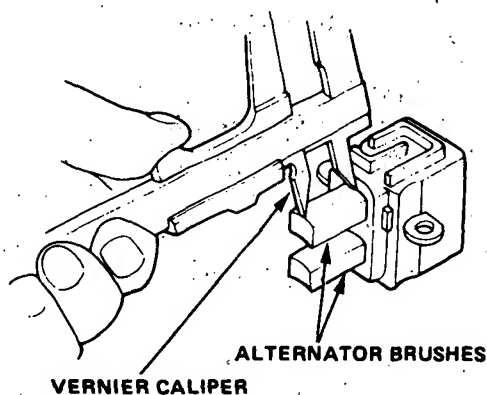
## Alternator Brush Inspection

1. Remove the end cover, then take out the brush holder by removing its two screws.
2. Measure the length of the brushes with a vernier caliper.

### Alternator Brush Length:

Standard: 10.5 mm (0.41 in)

Service Limit: 5.5 mm (0.22 in)

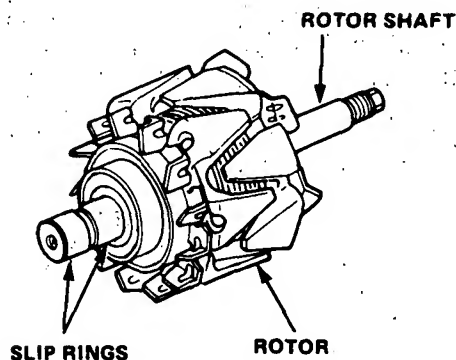


If the brushes are not within the service limit, replace the brush holder assembly.

# Charging System

## Rotor Slip Ring Test

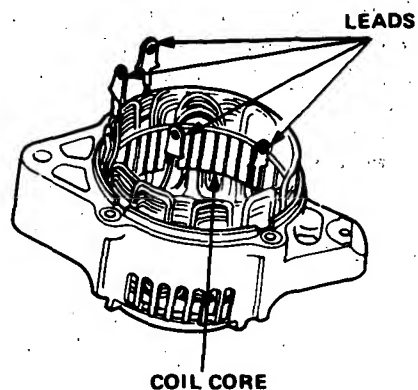
1. Check that there is continuity between the slip rings.
2. Check that there is no continuity between the rings and the rotor or rotor shaft.



3. If the rotor fails either continuity check, replace it.

## Stator Test

1. Check that there is continuity between each pair of leads.
2. Check that there is no continuity between each lead and the coil core.



3. If the coil fails either continuity check, replace the stator.



## Alternator Belt Adjustment

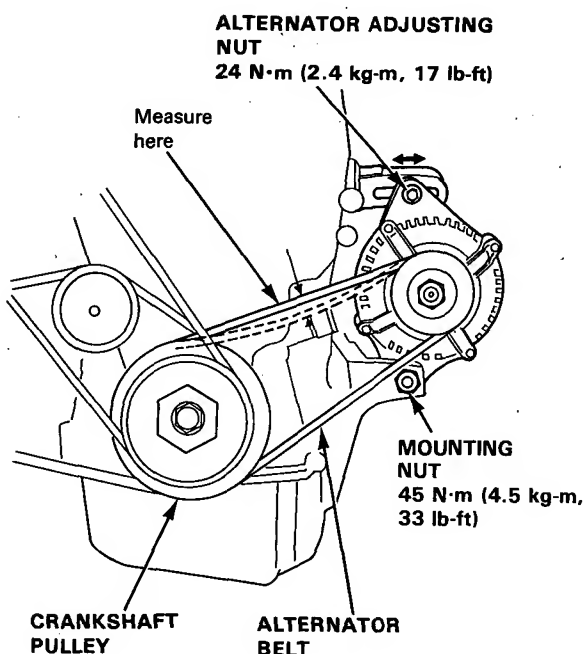
### Deflection method:

Apply a force of 100N (10 kg, 22 lb) and measure the deflection between the alternator and crankshaft pulley.

Deflection: 7.0–10.5 mm (0.28–0.41 in)

### NOTE:

- On a brand-new belt (one that has been run for less than five minutes), the deflection should be 5.0–7.0 mm (0.20–0.27 in) when first measured.
- If there are cracks or any damage evident in the belt, replace it with a new one.



### If adjustment is necessary:

1. Loosen the alternator adjusting nut and mounting nut.
2. Move the alternator to obtain the proper belt tension, then retighten the adjusting nut and mounting nut to the specified torques.
3. Recheck the deflection or tension of the belt.

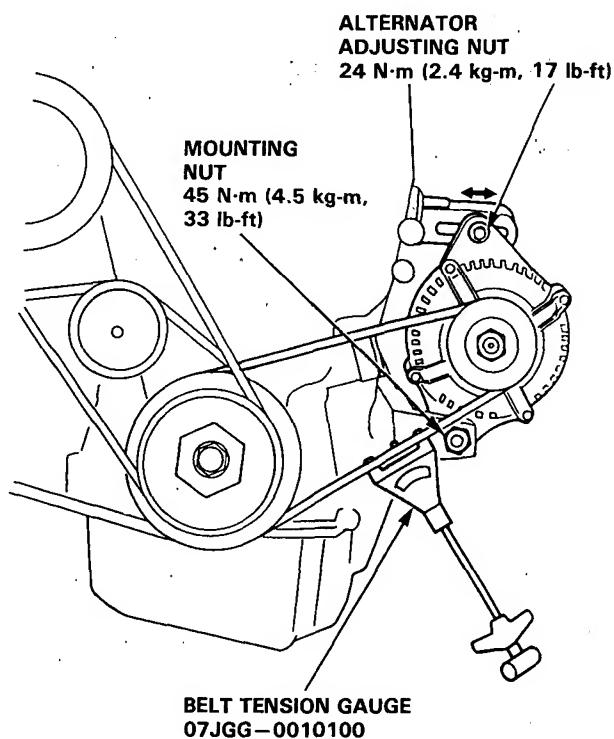
### Tension gauge method:

Attach the belt tension gauge to the belt and measure the tension. Follow the gauge manufacture's instructions.

Tension: 350–500 N (35–50 kg, 77–110 lbs)

### NOTE:

- On a brand-new belt (one that has been run for less than five minutes), the tension should be 700–900 N (70–90 kg, 154–198 lbs) when first measured.
- If there are cracks or any damage evident in the belt, replace it with a new one.

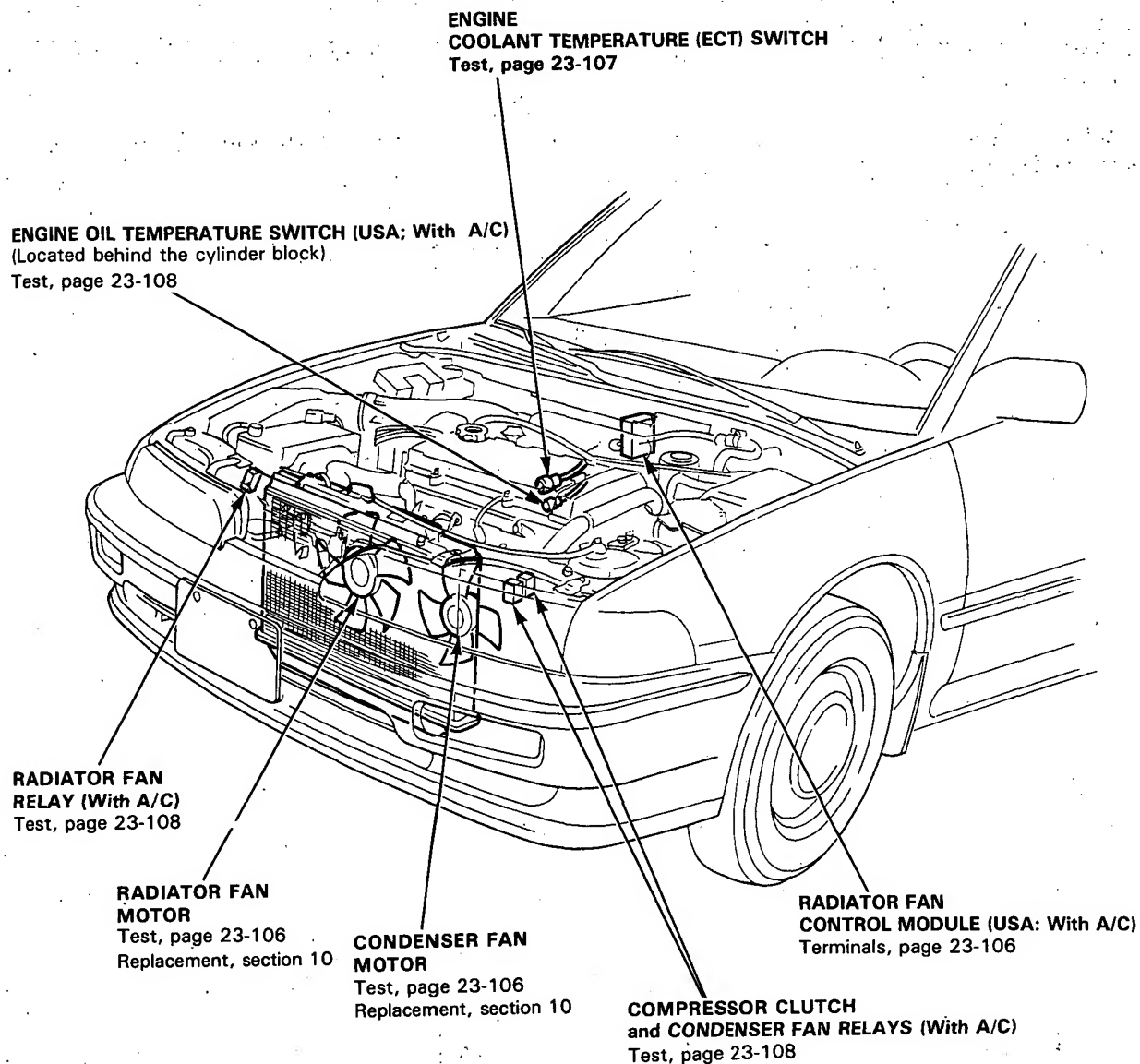


### If adjustment is necessary:

1. Loosen the alternator adjusting nut and mounting nut.
2. Move the alternator to obtain the proper belt tension, then retighten the adjusting nut and mounting nut to the specified torques.
3. Recheck the deflection or tension of the belt.
4. After adjusting, if necessary, adjust the P/S pump belt (see section 17) and A/C compressor belt (see section 22).

# Radiator and Condenser Fan Controls

## Component Location Index





## Circuit Diagram (USA)

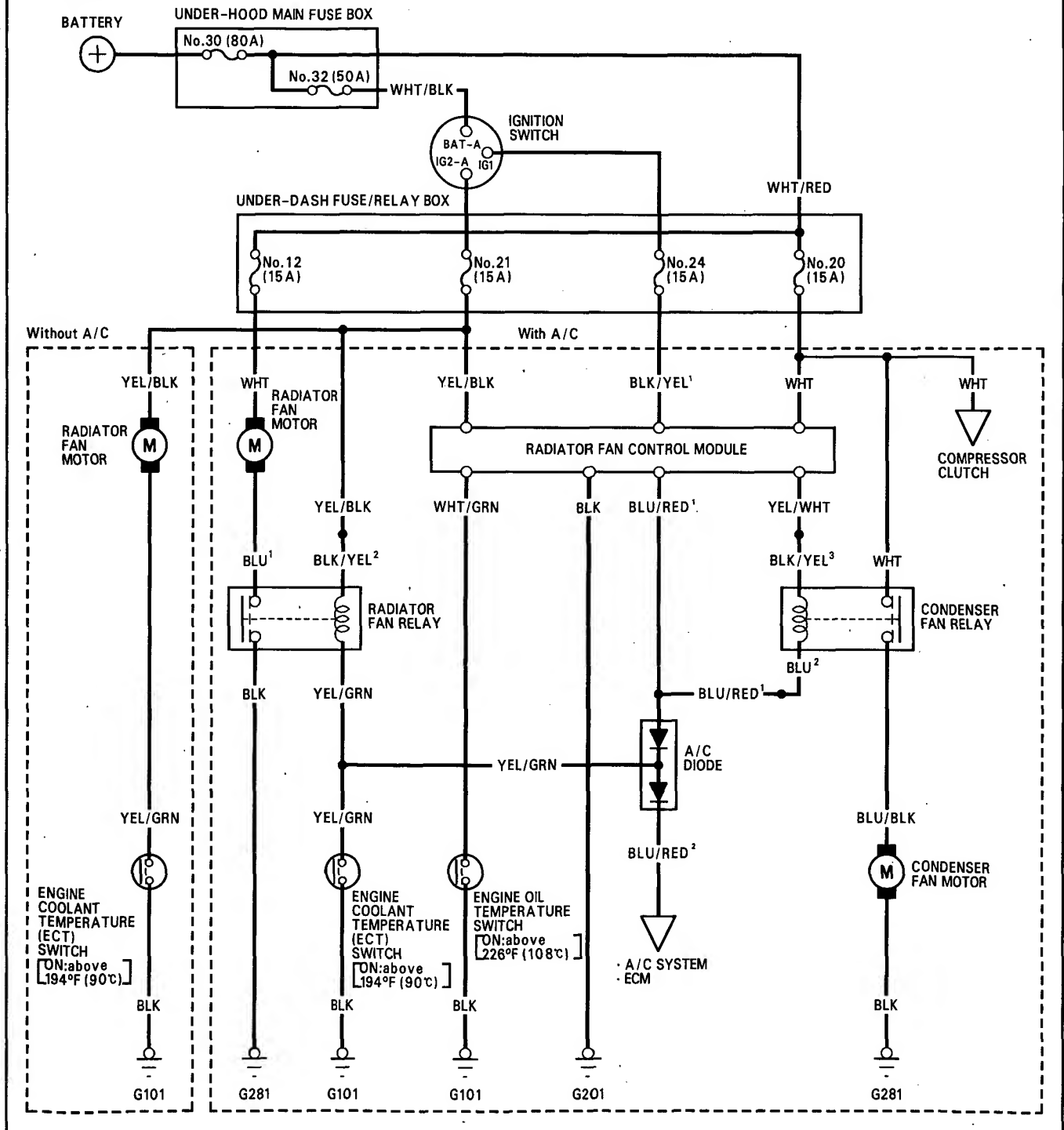
### Description

#### Fan Control system

When the engine oil temperature is above approximately 226°F (103°C) after the engine is stopped, the condenser fan starts running to cool the engine for 15 minutes.

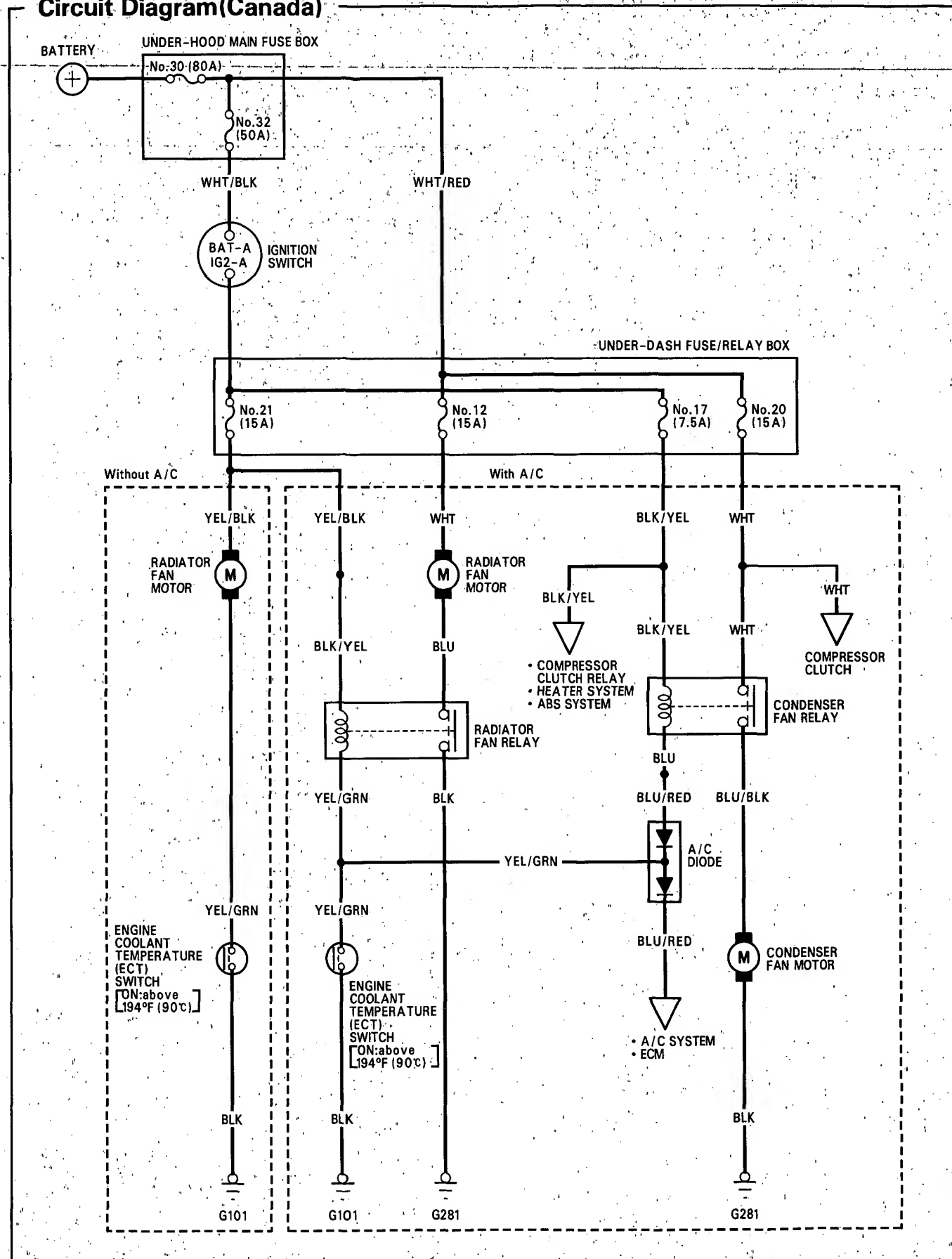
The oil temperature switch is located behind the cylinder block and the radiator fan control module is located at the right side of the heater unit.

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, BLU/RED<sup>1</sup> and BLU/RED<sup>2</sup> are not the same).



## Radiator and Condenser Fan Controls

## Circuit Diagram(Canada)







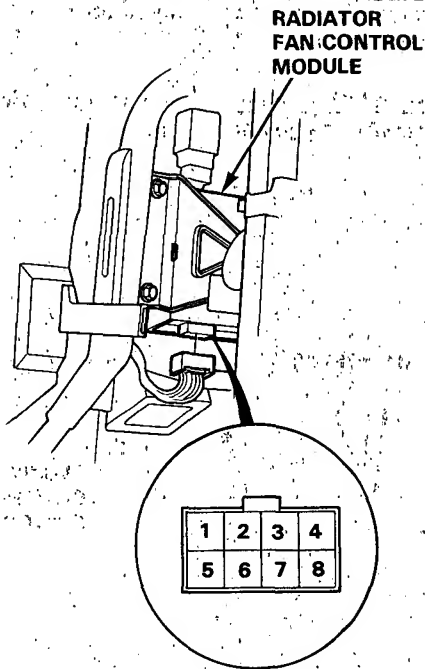
## Troubleshooting (USA: With A/C)

NOTE: The numbers in the table show the troubleshooting sequence.

Item to be inspected		Blown No.12 (15A) or No.20 (15A) fuse (In the under-dash fuse/relay box)	Radiator fan or condenser fan relay	Radiator fan or condenser fan motor	A/C diode	Blown No.21 (15A) fuse (In the under-dash fuse/relay box)	Engine coolant temperature (ECT) switch	Faulty radiator fan control module	Engine oil temperature switch	A/C system	Poor ground	Open circuit, loose or disconnected terminals
Symptom												
Only one fan runs (with engine and A/C ON).		1	2	3	4			5			G281	BLU <sup>1</sup> , BLU/BLK, YEL/BLK BLK/YEL <sup>2</sup> YEL/WHT, BLK/YEL <sup>3</sup> or BLU/RED <sup>2</sup>
Fans do not rotate.	Under all conditions.					1	2	3			G101	YEL/BLK or YEL/GRN
	A/C ON									1		
Radiator fan control module fails to function properly.								2	1		G201	WHT, WHT/GRN, BLU <sup>2</sup> or BLU/RED <sup>1</sup>

# Radiator and Condenser Fan Controls

## Radiator Fan Control Module Terminals (USA: With A/C)

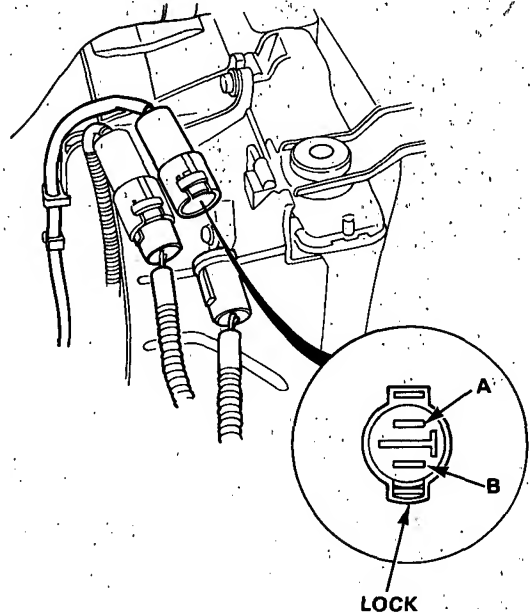


Terminal	Wire	Connects to
1	YEL/ WHT	Condenser fan relay ⊕
2	YEL/ BLK	Power supply (For condenser fan relay by way of timer unit with ignition switch ON)
3	—	(Not used)
4	BLK	Ground
5	WHT/ GRN	Engine oil temperature switch
6	WHT	Constant power (For condenser fan motor relay by way of radiator fan control module)
7	BLK/ YEL	IG1 (Timer reset signal)
8	BLU/ RED	Condenser fan relay ⊖

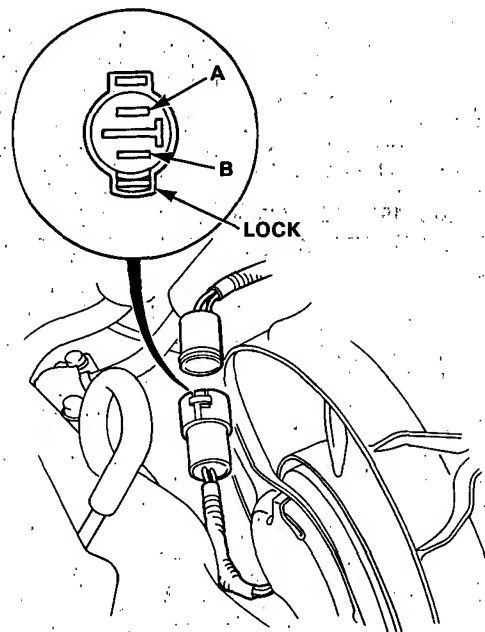
## Fan Motor Test

1. Disconnect the 2-P connector from the fan motor.
2. Test motor operation by connecting battery power to the A terminal, and ground to the B terminal.
3. If the motor fails to run smoothly, replace it.

### Radiator Fan Motor:



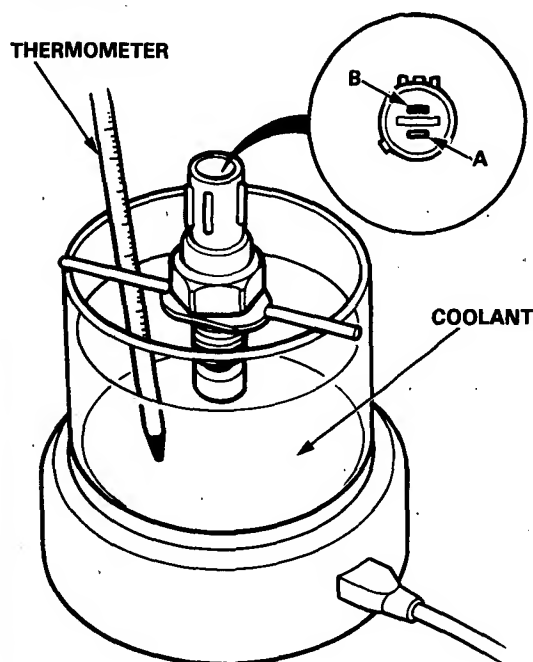
### Condenser Fan Motor:





## Engine Coolant Temperature (ECT) Switch Test

1. Remove the engine coolant temperature (ECT) switch from the rear of the engine cylinder block.
2. Suspend the ECT switch in a container of coolant as shown.

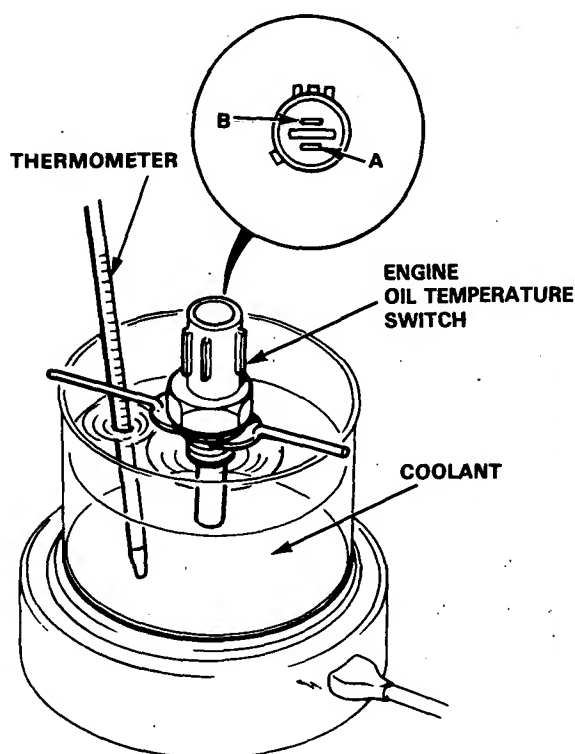


3. Heat the coolant and check coolant temperature with a thermometer (see table below).
4. Check for continuity between the A and B terminals according to the table.

Terminal		A	B
Temperature			
Switch	Above 196–203°F (91–95°C)	○	○
	Below 181–189°F (83–87°C)		

## Engine Oil Temperature Switch Test (USA: With A/C)

1. Remove the engine oil temperature switch from the cylinder head.
2. Suspend the engine oil temperature switch in a container of coolant as shown.



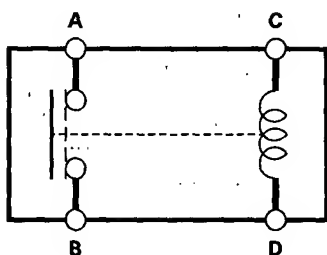
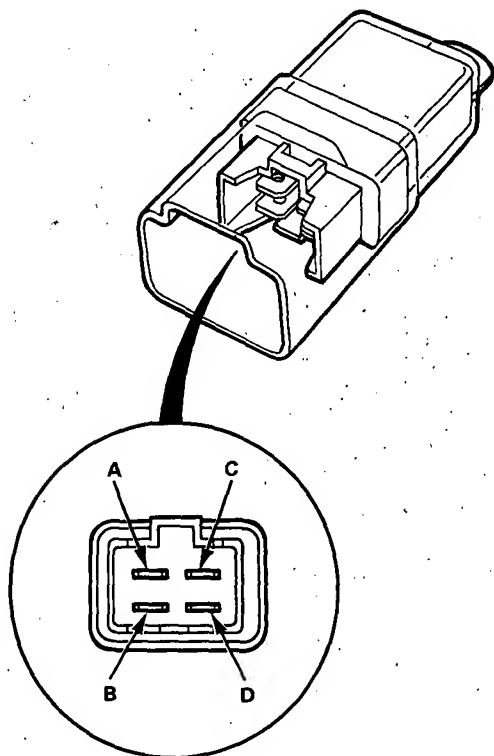
3. Heat the coolant and check coolant temperature with a thermometer (see table below).
4. Check for continuity between the A and B terminals according to the table.

Terminal		A	B
Temperature			
Switch	Above 221–232°F (105–111°C)	○	○
	Below 208–228°F (98–109°C)		

# Radiator and Condenser Fan Controls

## Relay Test (With A/C)

1. There should be continuity between the C and D terminals.
2. There should be continuity between the A and B terminals when battery power and ground are connected to the C and D terminals. There should be no continuity when power is disconnected.





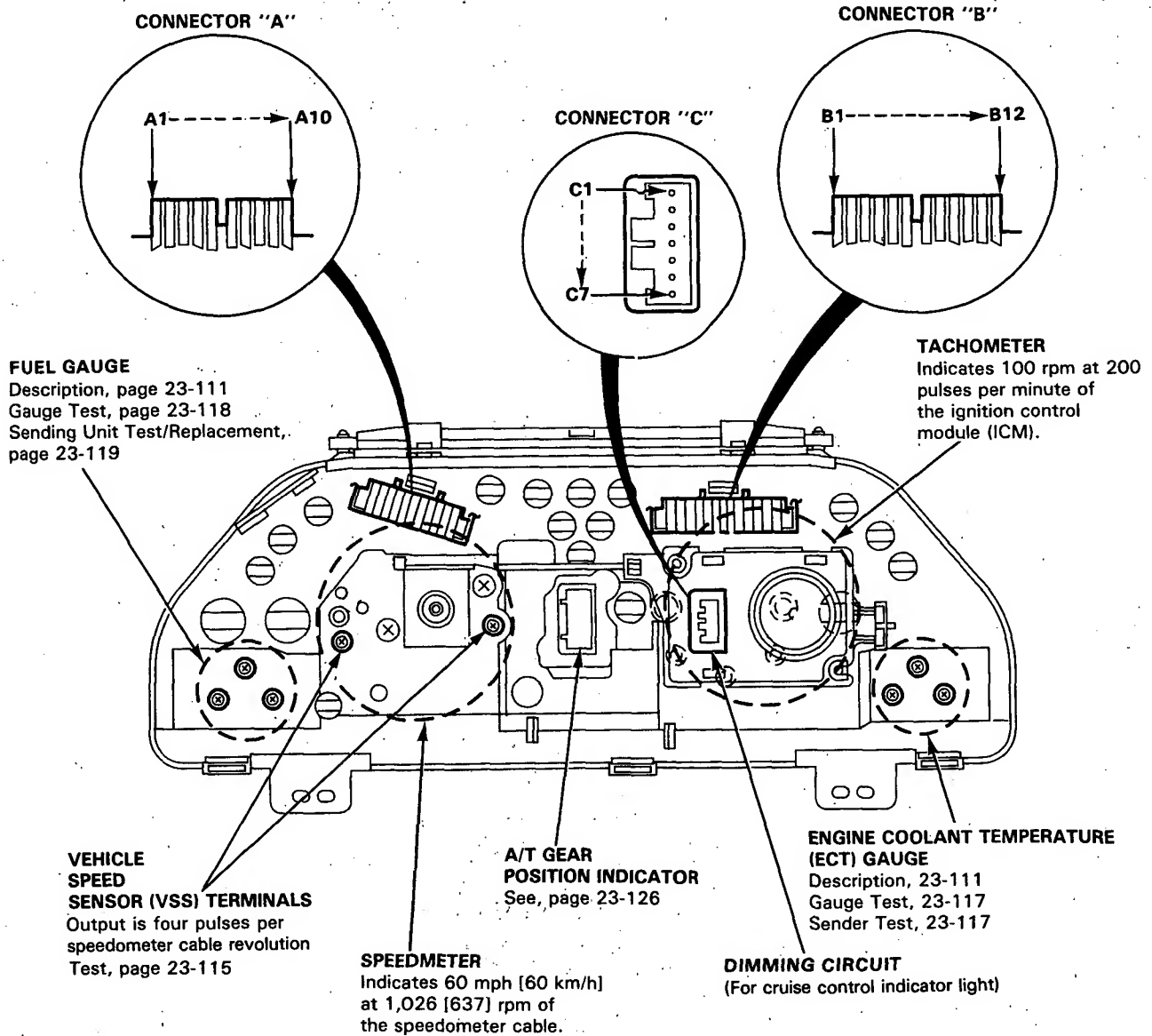
# Gauge Assembly

## Gauge/Indicator Location Index

### GAUGE ASSEMBLY

Removal, page 23-115

Disassembly, page 23-116

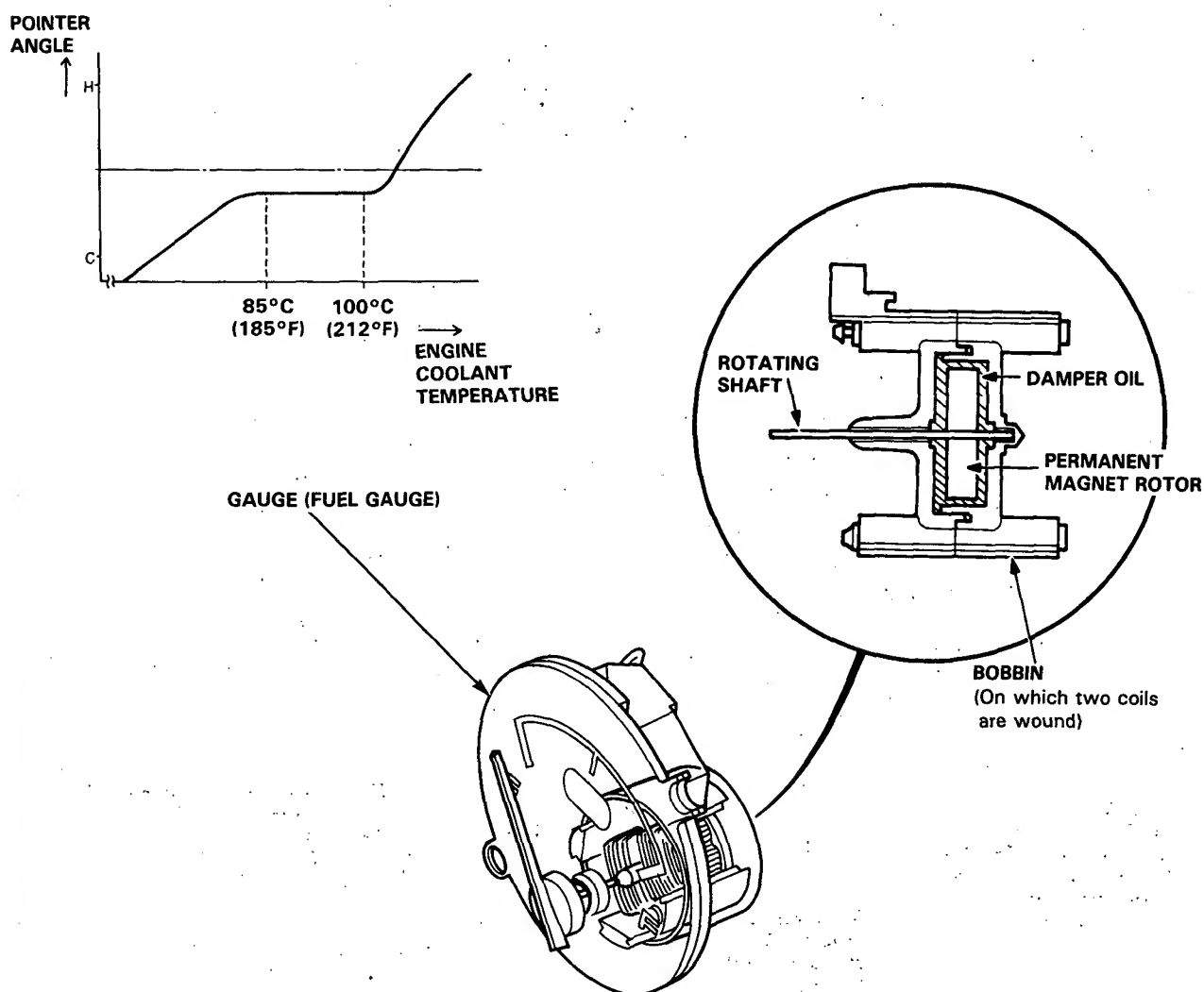




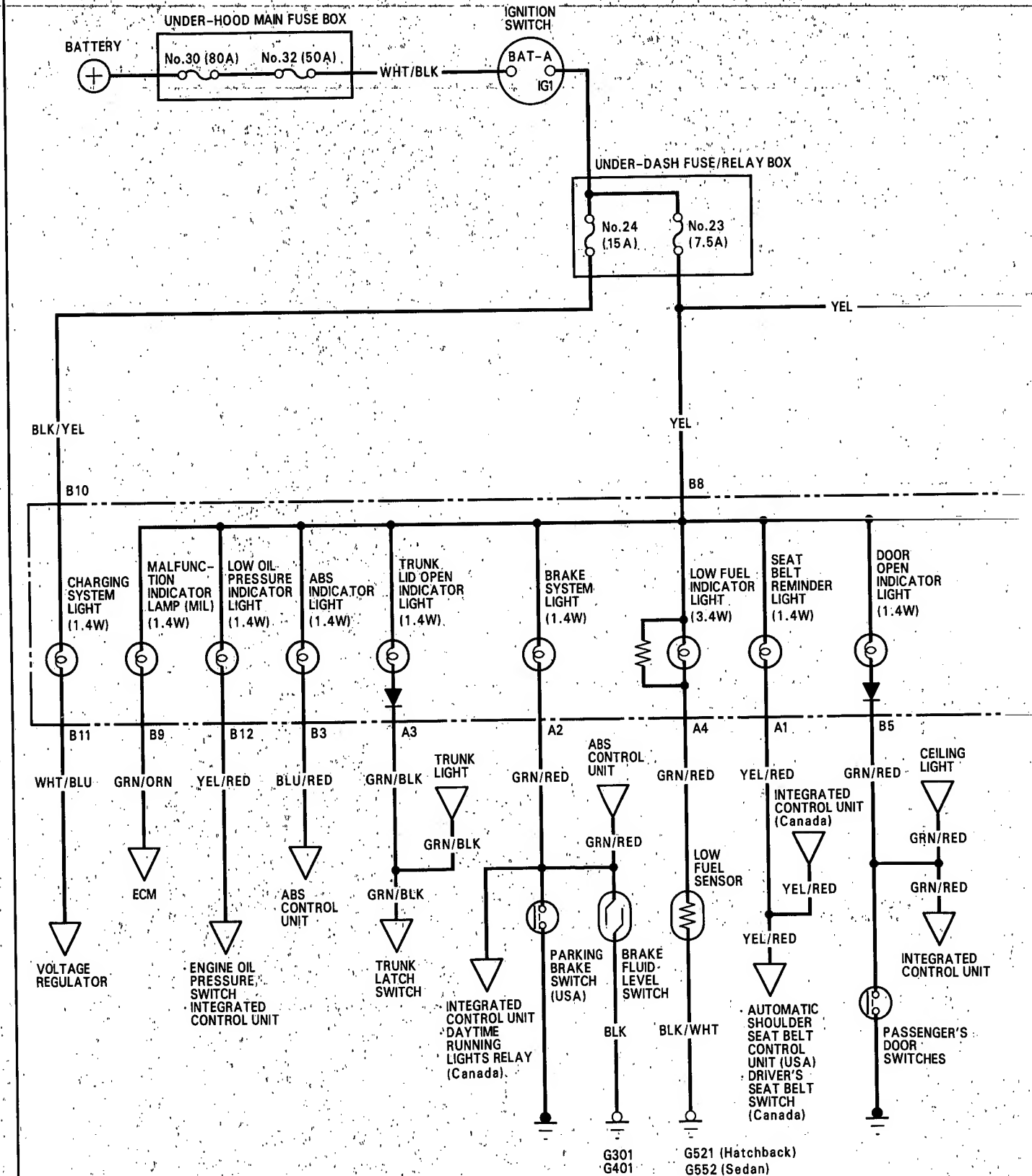
## Description

### Bobbin Type (Cross Coil Type) Gauge:

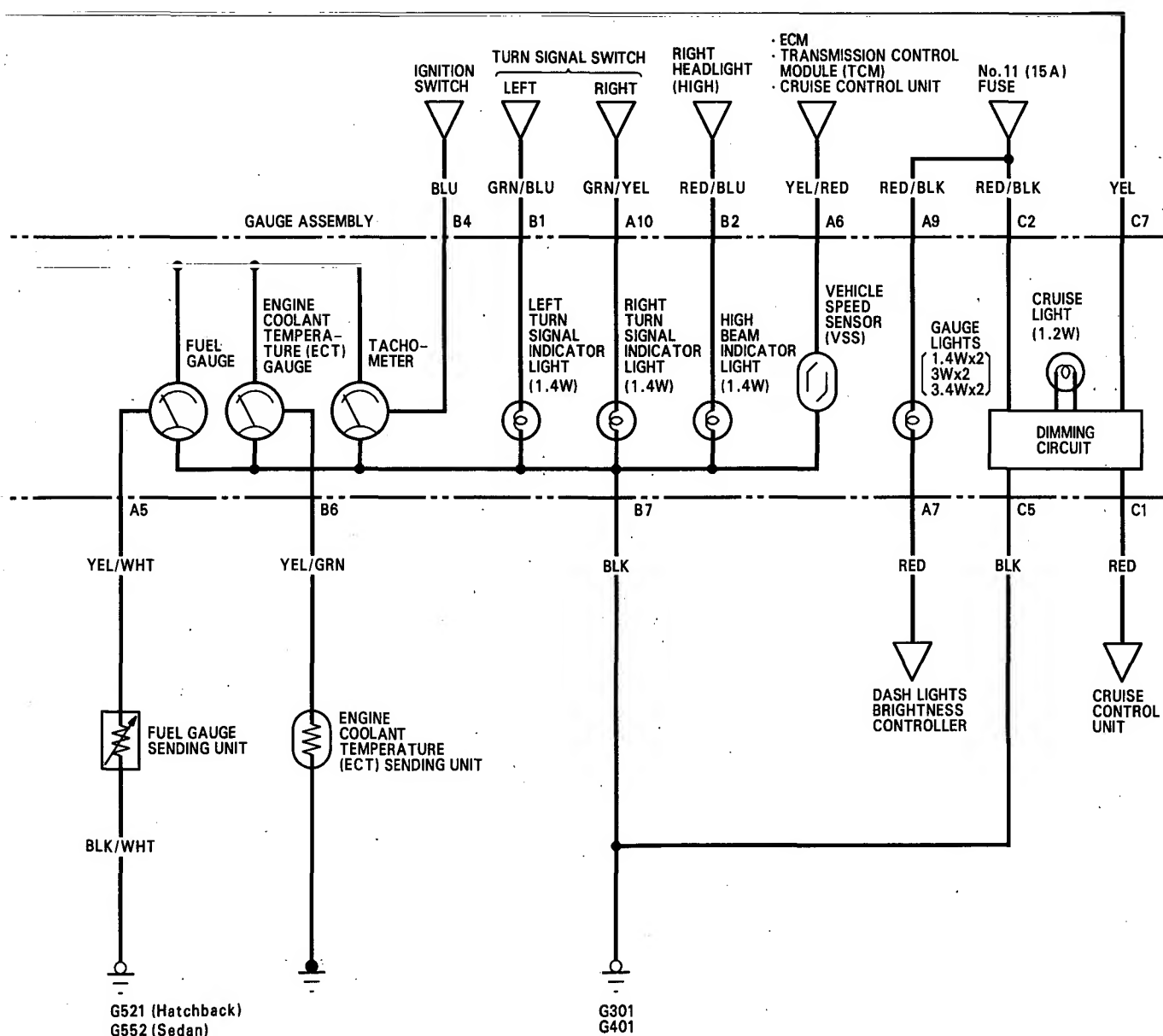
- A bobbin type gauge is an electromagnetic instrument in which two intersecting coils are wound around the permanent magnet rotor. A change in the resistance of the sending unit entails a change of the current which flows through the coil; the magnetic force energized by the coil will vary, causing the rotor (pointer) to move. A sliding resistance is employed in the fuel gauge just as in a bimetal type gauge, and a thermistor is used in the temperature gauge.
- The rotor of the fuel gauge is immersed in damper oil and its center of gravity lies roughly along the rotating shaft, hence the fuel level is indicated continuously even when the ignition switch is OFF.
- The engine coolant temperature (ECT) gauge is a center point stable small indicating angle type which indicates the temperature of the engine coolant between about 185°F (85°C) and 212°F (100°C).



# Gauge Assembly Circuit Diagram

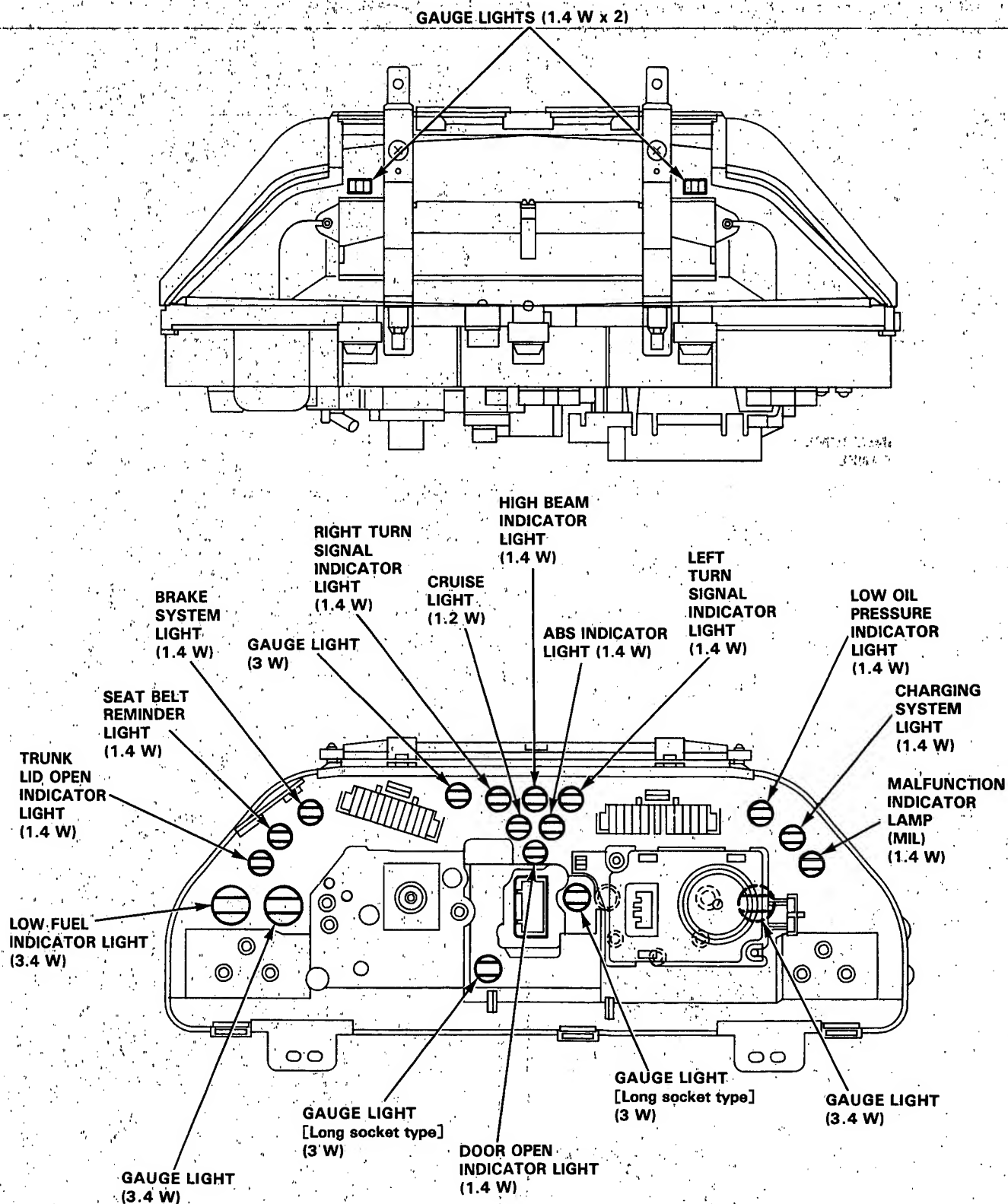






# Gauge Assembly

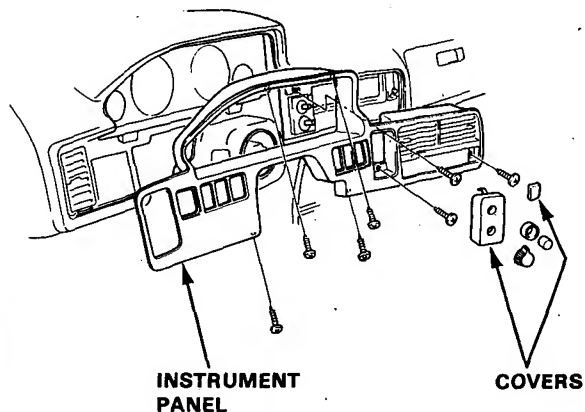
## Bulb Locations



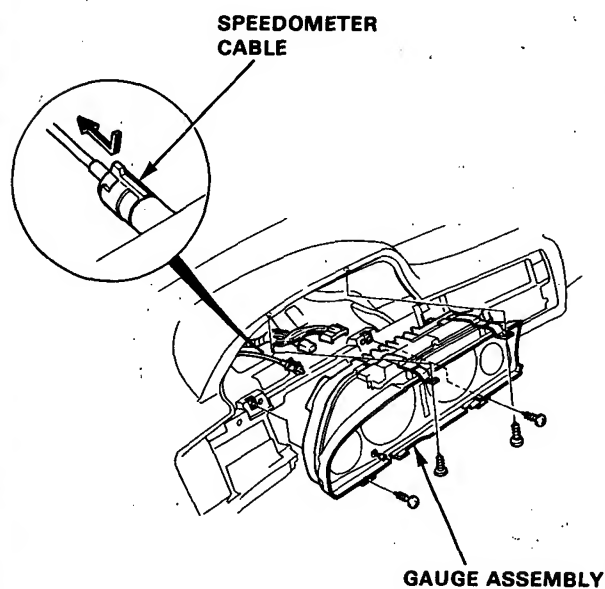


## Removal

1. Remove the screws and the instrument panel from the dashboard, then disconnect each switch connector.

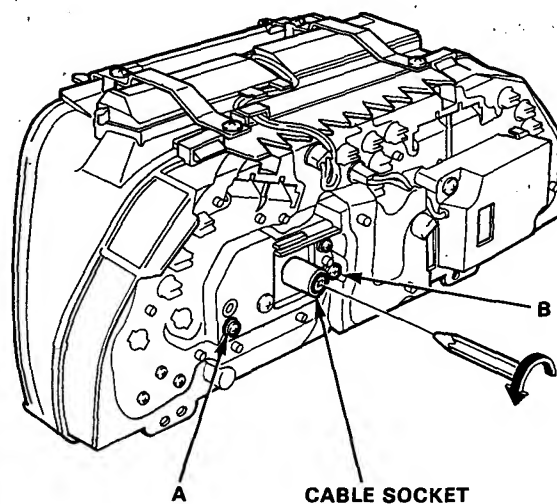


2. Remove the four screws, then remove the gauge assembly half-way, and disconnect the speedometer cable and connectors.



## Vehicle Speed Sensor (VSS) Test

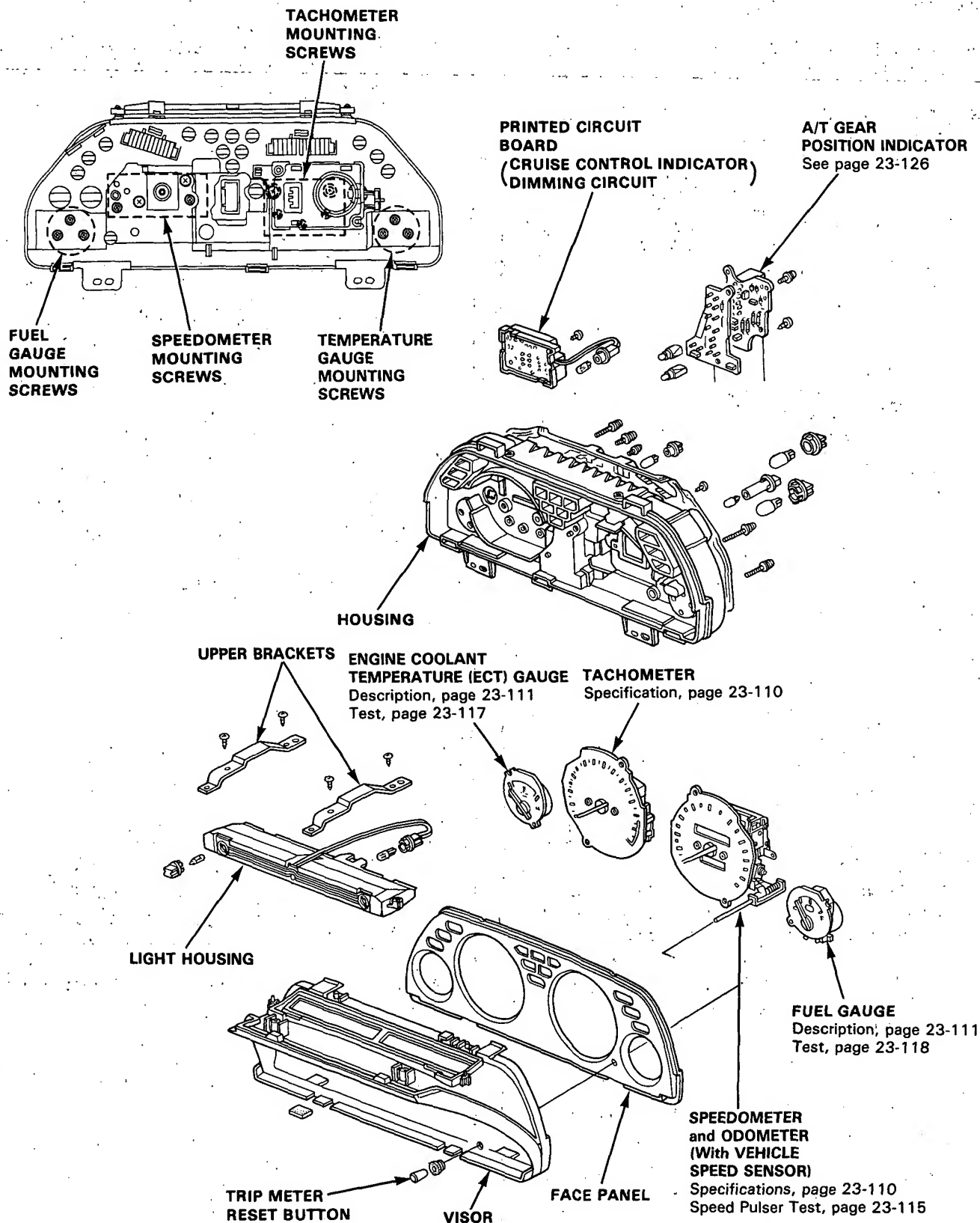
1. Remove the gauge assembly from the dashboard, then turn it over.
2. Break the lead off a pencil tip, then insert the pencil into the speedometer cable socket and turn it. Connect an ohmmeter between the A and B terminals. There should be continuity between the A and B terminals four times per revolution.



# Gauge Assembly

## Disassembly

NOTE: Handle the terminals and printed circuit boards carefully to avoid damaging them.



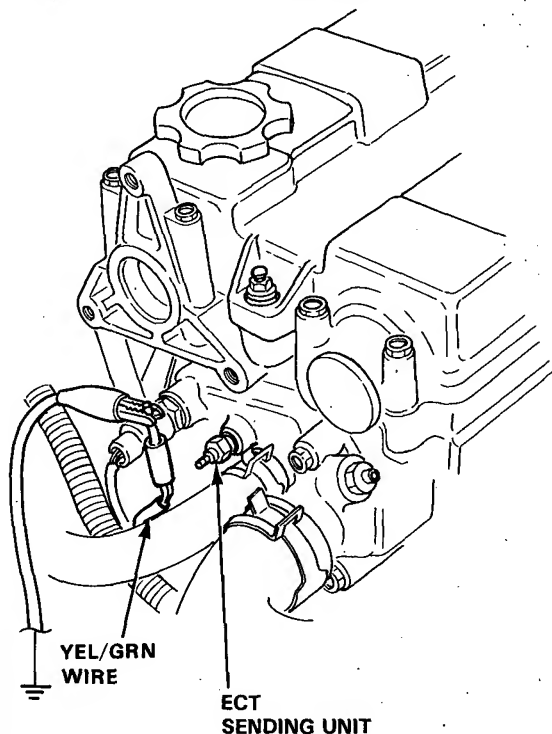
# Engine Coolant Temperature (ECT) Gauge



## Gauge Test

NOTE: Refer to page 23-113 for the circuit diagram of the engine coolant temperature (ECT) gauge.

1. Check the No. 23 (7.5 A) fuse in the under-dash fuse/relay box before testing.
2. Make sure the ignition switch is OFF, the disconnect the YEL/GRN wire from the ECT sending unit and ground it with a jumper wire.



3. Turn the ignition switch ON. Check that the pointer of the ECT gauge starts moving toward the "H" mark.

**CAUTION:** Turn the ignition switch OFF before the pointer reaches the "H" mark on the gauge dial. Failure to do so may damage the gauge.

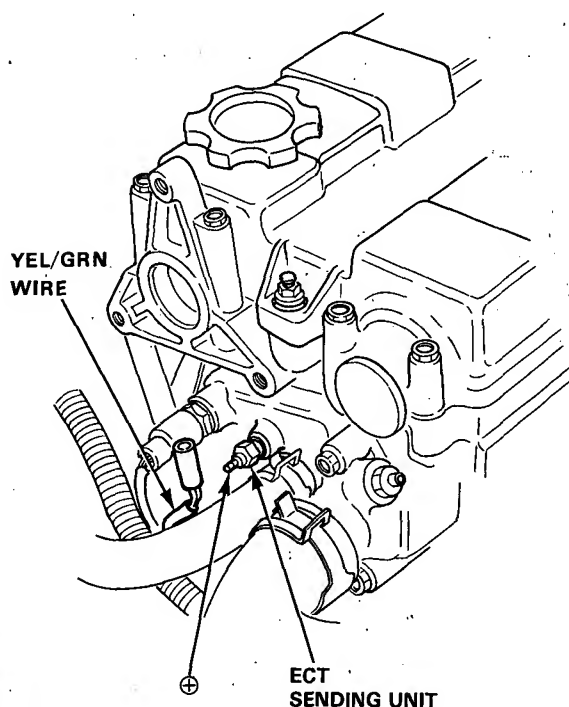
- If the pointer of the gauge does not swing at all, check for:
  - Blown No. 23 (7.5 A) fuse in the under-dash fuse/relay box.
  - An open in the YEL or YEL/GRN wire.

Replace the ECT gauge if the fuse and wiring are normal.

- If the gauge works normally, inspect the sending unit.

## Sending unit

1. Disconnect the YEL/GRN wire from the sending unit.
2. With the engine cold, use an ohmmeter to measure resistance between the positive terminal and the engine (ground).



3. Check the temperature of the coolant.
4. Run the engine and measure the change in resistance with the engine at operating temperature (radiator and condenser fans come on).

Temperature	133°F (56°C)	185°F (85°C) — ["C" mark]
Resistance (Ω)	142	49 — 32

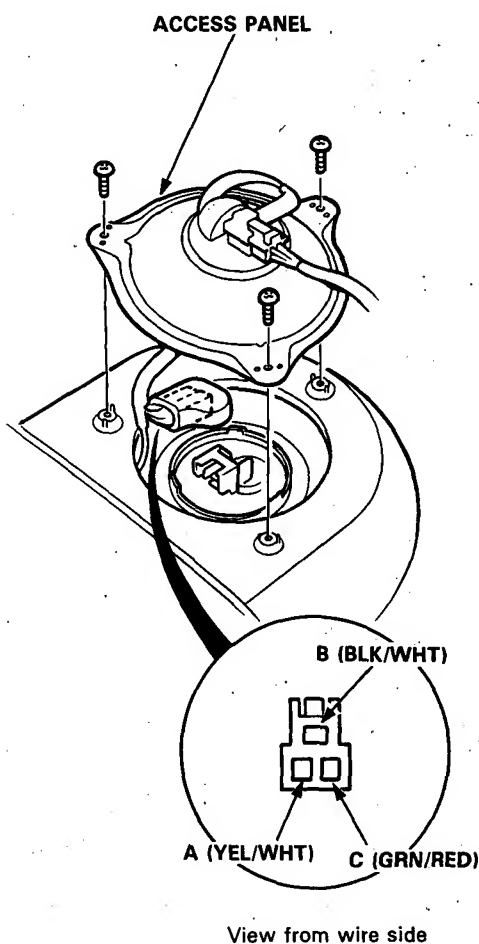
5. If your readings are substantially different from the specifications above, replace the sending unit.

# Fuel Gauge

## Gauge Test

NOTE: Refer to page 23-113 for the circuit diagram of the fuel gauge.

1. Check the No. 23 (7.5 A) fuse in the under-dash fuse/relay box before testing.
2. Remove the rear seat (see section 20), then remove the access panel.
3. Disconnect the 3-P connector from the fuel gauge sending unit.



4. Connect the voltmeter positive probe to the A (YEL/WHT) terminal and the negative probe to the B (BLK/WHT) terminal, then turn the ignition switch ON.

There should be between 5 and 8V.

- If the voltage is as specified, go to step 4.
- If the voltage is not as specified, check for:
  - Blown No. 23 (7.5 A) fuse in the under-dash fuse/relay box.
  - An open in the YEL, YEL/WHT or BLK/WHT wire.
  - Poor ground (G521 or G552)

5. Turn the ignition switch OFF. Attach a jumper wire between the A (YEL/WHT) and B (BLK/WHT) terminals.

Turn the ignition switch ON.

Check that the pointer of the fuel gauge starts moving toward the "F" mark.

**CAUTION:** Turn the ignition switch OFF before the pointer reaches the "F" mark on the gauge dial. Failure to do so may damage the fuel gauge.

NOTE: The fuel gauge is a bobbin (cross coil) type, hence the fuel level is continuously indicated even when the ignition switch is OFF, and the pointer moves slower than that of a bimetal type.

- If the pointer of the fuel gauge does not swing at all, replace the gauge.
- If the gauge is OK, inspect the fuel gauge sending unit.

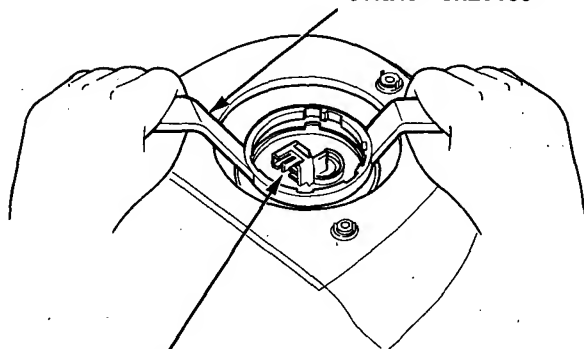


## Sending Unit Test/Replacement

**⚠ WARNING** Do not smoke while working on the fuel system. Keep open flame away from the work area.

1. Remove the rear seat (see section 20), then remove the access panel.
2. With the ignition switch OFF, disconnect the 3-P connector from the fuel gauge sending unit.
3. Remove the fuel gauge sending unit.

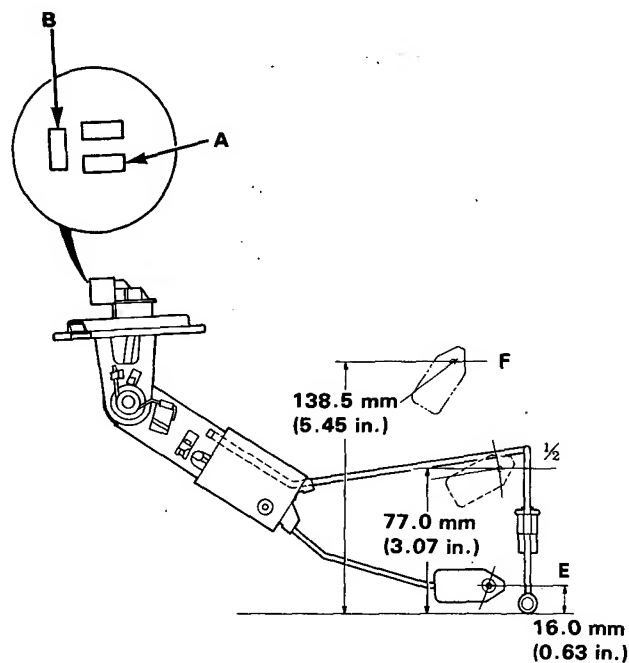
FUEL SENDER WRENCH  
07920—SB20000  
or  
07NAC—SR20100



FUEL GAUGE  
SENDING UNIT

4. Measure the resistance between the A and B terminals at E (EMPTY), 1/2 (HALF FULL), and F (FULL) by moving the float.

Float Position	E	1/2	F
Resistance ( $\Omega$ )	105—110	25.0—39.0	2—5



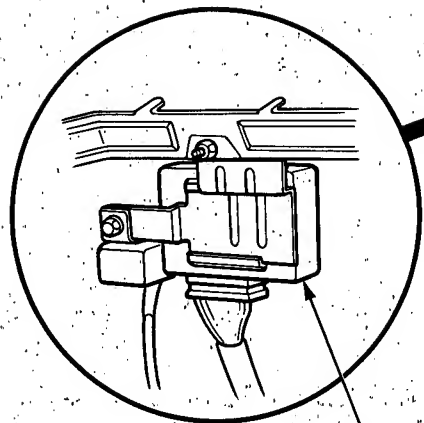
5. If you don't obtain the above readings, replace the fuel gauge sending unit.

# Interlock System

## Component Location Index

- A/T GEAR POSITION INDICATOR  
See page 23-126

**KEY INTERLOCK SOLENOID  
and KEY INTERLOCK SWITCH**  
(In the steering lock assembly)  
Test, page 23-124



**INTERLOCK  
CONTROL  
UNIT**  
Input Test, page 23-123

**SHIFT LOCK SOLENOID**  
Test, page 23-125  
Replacement, page 23-125

**A/T GEAR  
POSITION SWITCH**  
Test, page 23-130  
Replacement, page 23-131





## Description

The car is equipped with the following devices to prevent inadvertent shifting:

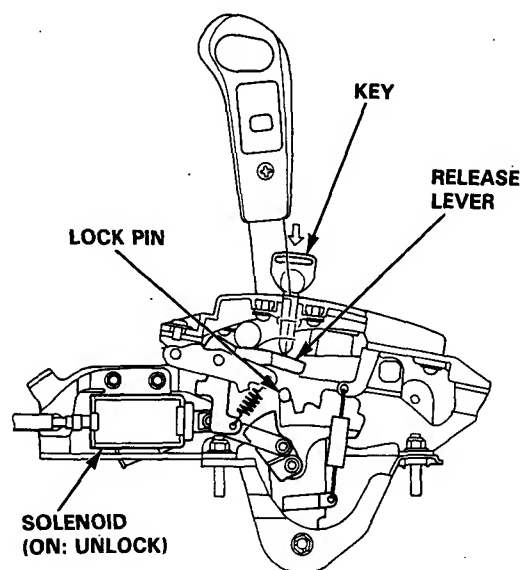
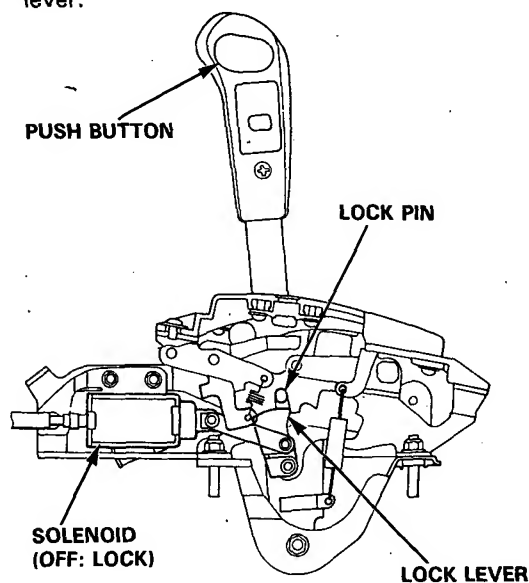
- A/T shift lever assembly with shift lock.
- Ignition key cylinder with interlock mechanism.

### Shift Lock System

The shift lock system prevents the shift lever from moving to **[R]** or **[D]** from the **[P]** position unless the brake pedal is depressed and the accelerator is in its rest position.

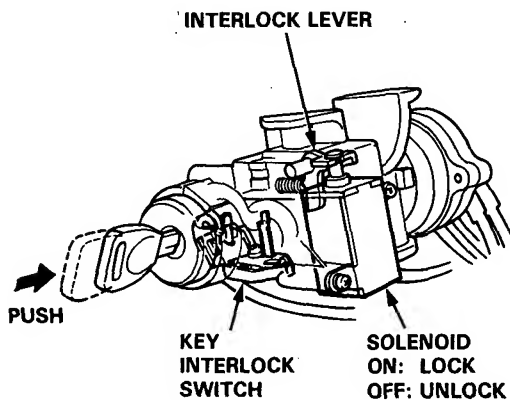
#### NOTE:

- The shift lever cannot be shifted when the brake pedal and the accelerator are stepped on at the same time.
- In case of system malfunction, the shift lever can be released by pushing a key into the release slot near the shift lever.

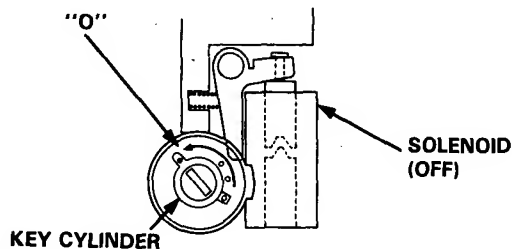


### Key Interlock System:

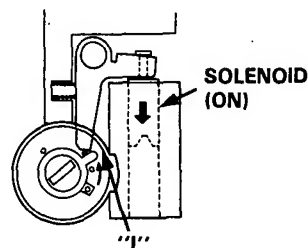
The ignition key cannot be removed from the ignition switch unless the shift lever is in the **[P]** position. When the shift lever is in any position other than **[P]** position, a solenoid is activated, making it impossible for the key to be removed until the lever is moved to the **[P]** position.



The shift lever is in the **[P]** position.



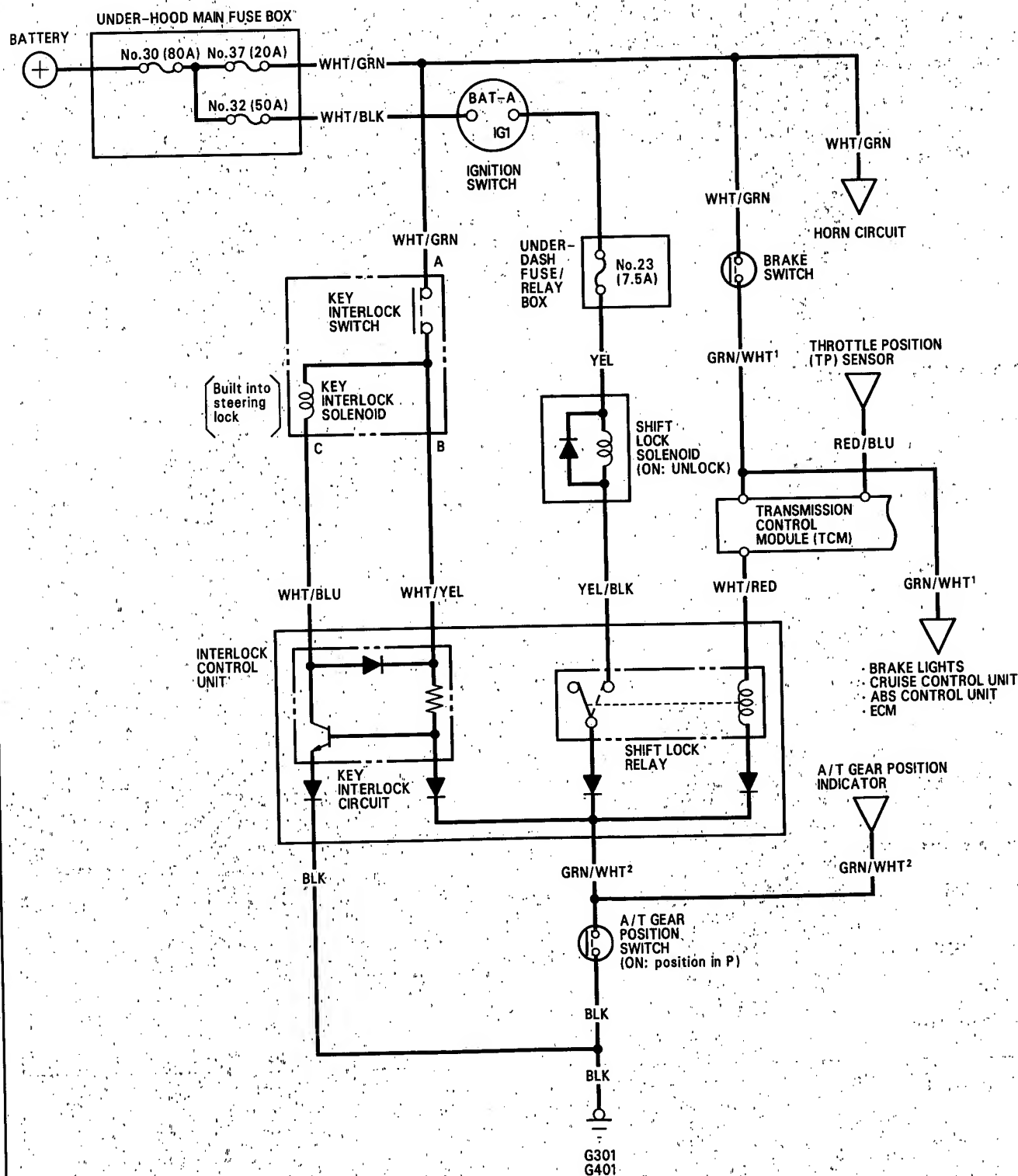
The shift lever is in any position except **[P]**.



# Interlock System

## Circuit Diagram

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, GRN/WHT<sup>1</sup> and GRN/WHT<sup>2</sup> are not the same).

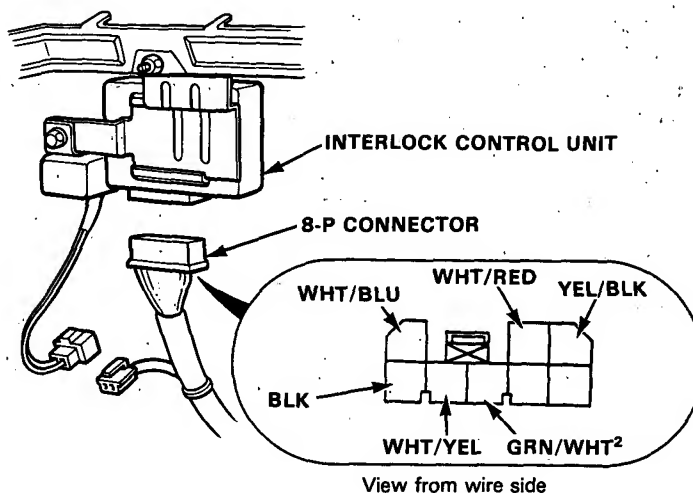




## Control Unit Input Test

Disconnect the 8-P connector from the control unit. Check for good contact between the connector and socket terminals. If the terminals are OK, make following input tests at the connector. If all input tests are OK, but the problem remains, replace the control unit.

**NOTE:** If the shift lock solenoid clicks when the ignition switch is ON and the brake pedal is pushed (shift lever is in **P** position, accelerator is in rest position), the shift lock system is electronically normal; test the A/T gear position switch as described on page 23-130.



### Shift Lock System:

No.	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
1	WHT/RED	Ignition switch ON. Brake pedal pushed.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 37 (20A) fuse. (in the under-hood main fuse box)</li> <li>• Faulty brake switch.</li> <li>• Faulty throttle position (TP) sensor</li> <li>• Faulty transmission control module (TCM).</li> <li>• An open in the wire.</li> </ul>
		Ignition switch ON. Step on the brake pedal and the accelerator at the same time.	Check for voltage to ground: There should not be battery voltage.	
2	GRN/WHT <sup>2</sup>	Shift lever in position <b>P</b> .	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty A/T gear position switch.</li> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
3	YEL/BLK	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No.23 (7.5A) fuse. (in the under-dash fuse/relay box)</li> <li>• Faulty shift lock solenoid.</li> <li>• An open in the wire.</li> </ul>

### Key Interlock System:

No.	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
2	GRN/WHT <sup>2</sup>	Shift lever in position <b>P</b> .	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty A/T gear position switch.</li> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
3	WHT/BLU	Ignition switch turned to ACC (1) and the key pushed in.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No.37 (20A) fuse. (in the under-hood main fuse box)</li> <li>• Faulty steering lock assembly (key interlock solenoid).</li> <li>• An open in the wire.</li> </ul>
	WHT/YEL			

# Interlock System

## Key Interlock Solenoid Test

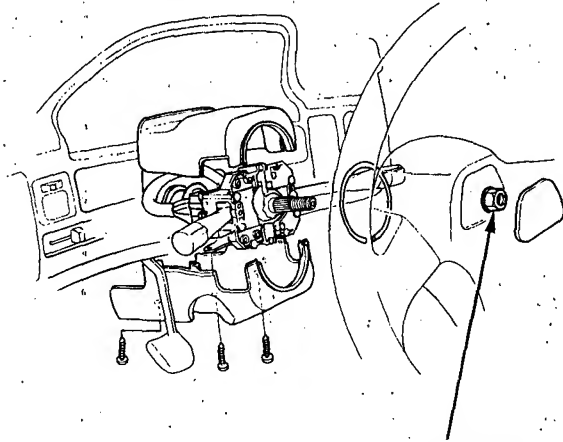
### NOTE:

The radio may have a coded theft protection circuit. Be sure to get the customer's code number before

- Disconnecting the battery.
- Removing the No. 14 (15 A) fuse (in the under-dash fuse/relay box).
- Removing the radio.

After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

1. Disconnect the battery negative terminal before replacement.
2. Remove the steering wheel, then remove the steering column covers.



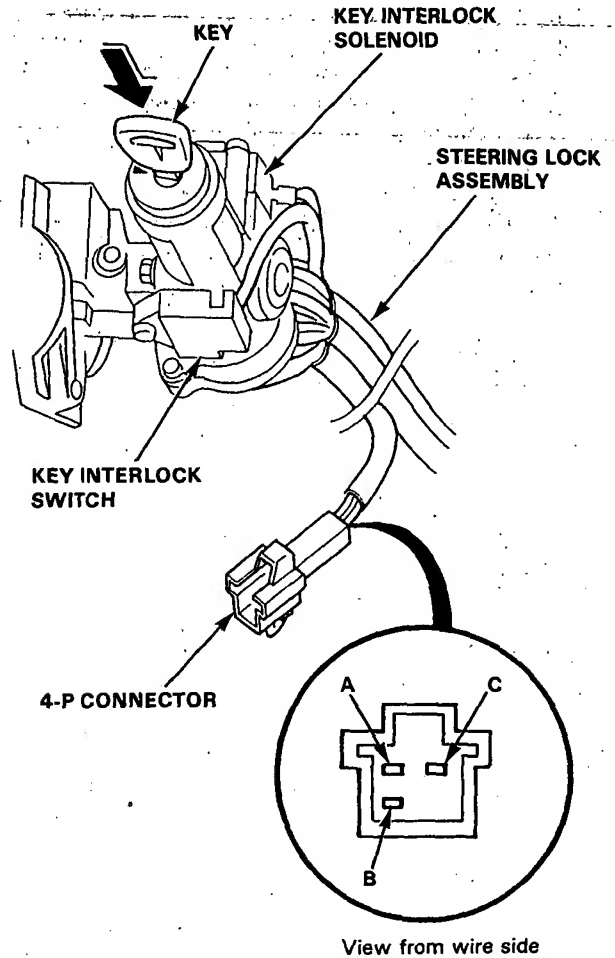
**SELF-LOCKING  
NUT 50 N·m  
(5.0 kg-m, 36.2 lb-ft)  
Replace.**

3. Disconnect the 4-P connector from the dashboard wire harness.
4. Check for continuity between the terminals in each switch position according to the table.

Terminal		A	B		C
Position					
Ignition switch ACC (I)	Key pushed in.	○	○	—	○
	Key released.		○	—	○

5. Check that the key cannot be removed when battery power and ground are connected to the A and C terminals.

- If the key cannot be removed, the key interlock solenoid is OK.
- If the key can be removed, replace the steering lock assembly (key interlock solenoid is not available separately).



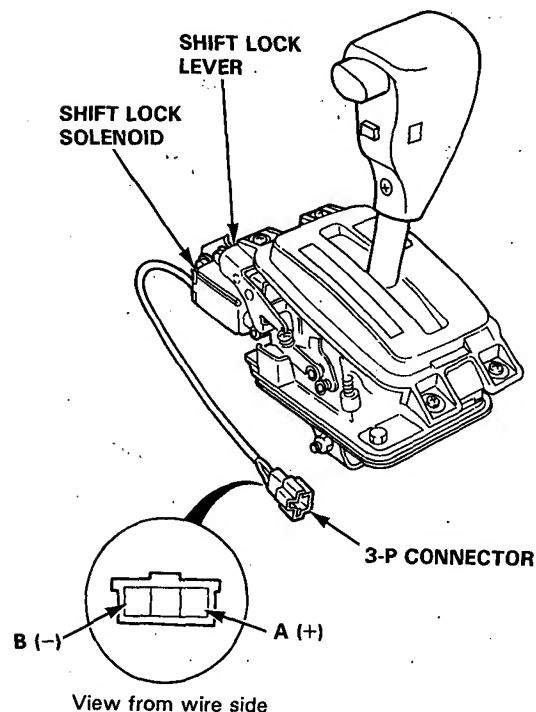


## Shift Lock Solenoid Test

1. Remove the console, then disconnect the 3-P connector of the shift lock solenoid from the main wire harness.

**NOTE:** Do not connect power to the B (-) terminal (reverse polarity) or you will damage the diode inside the solenoid.

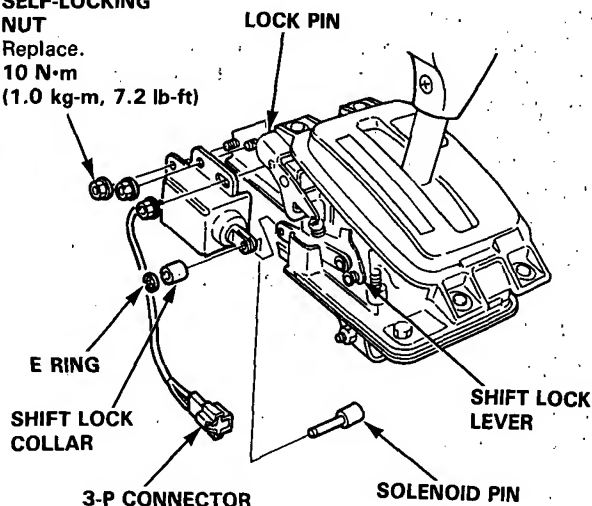
2. Connect battery power to the A terminal, ground the B terminal momentarily, and check solenoid operation.



- If the solenoid does not operate, replace it as described in steps 3, 4, and 5.
- If the solenoid operates, check and, if necessary, adjust its two positions as shown in step 5.

3. Remove the E ring and the solenoid pin.
4. Remove the self-locking nuts and shift lock solenoid, then install the new solenoid in the reverse order of removal.

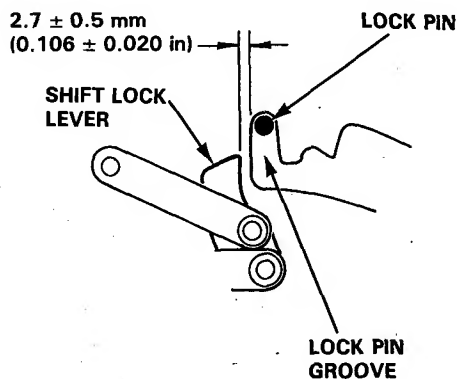
**SELF-LOCKING NUT**  
Replace.  
10 N·m  
(1.0 kg-m, 7.2 lb-ft)



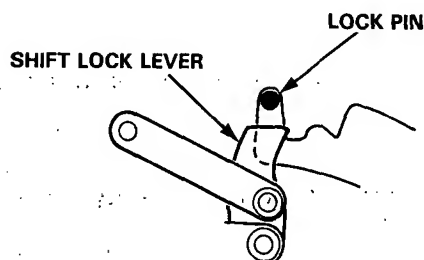
5. Check and, if necessary, adjust the solenoid's position.

- When the shift lock solenoid is ON, check that there is a clearance of  $2.7 \pm 0.5$  mm ( $0.106 \pm 0.020$  in) between the top rear corner of the shift lock lever and the lock pin groove, then tighten the self-locking nuts.

**NOTE:** Use new self-locking nuts.



- When the shift lock solenoid is OFF, make sure that the lock pin is blocked by the shift lock lever.



# A/T Gear Position Indicator

## Component Location Index

- **GAUGE ASSEMBLY**

Removal, page 23-115

Disassembly, page 23-116

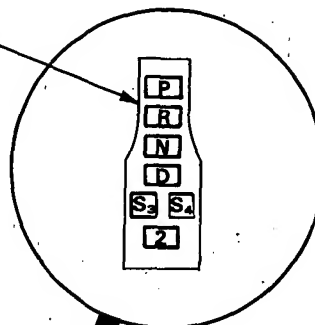
- **INTERLOCK SYSTEM**

See page 23-120

- **A/T CONTROL SYSTEM**

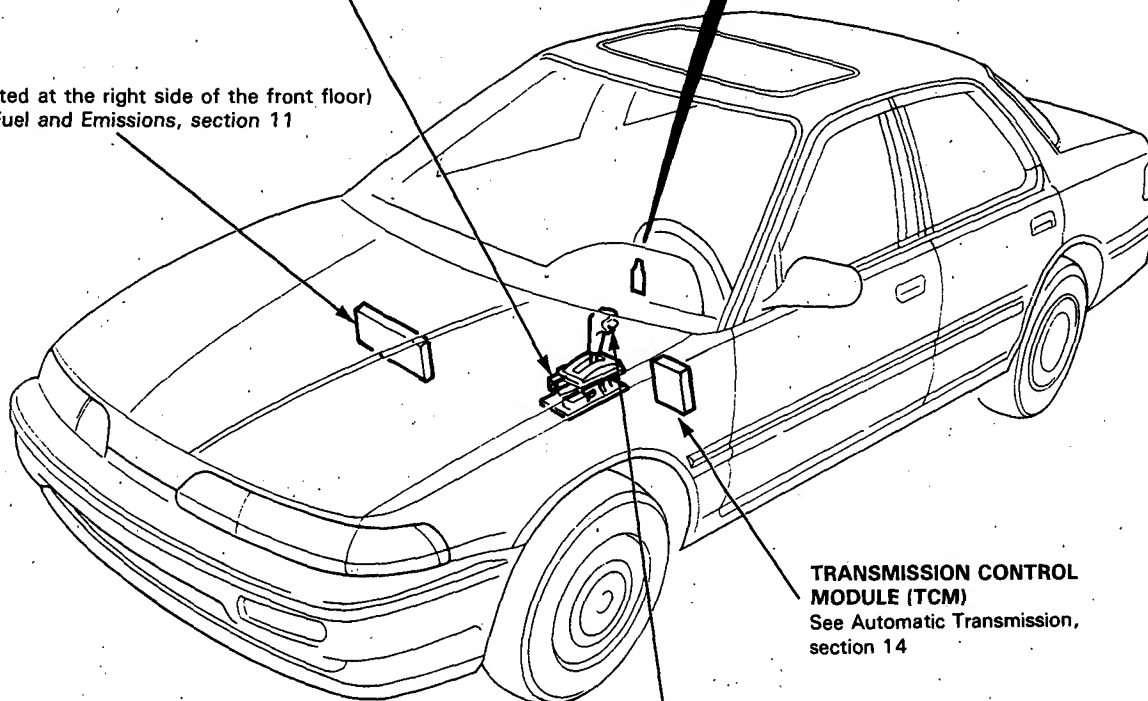
See Automatic Transmission, section 14

**A/T GEAR POSITION  
INDICATOR**  
Input Test, page 23-129



**A/T GEAR  
POSITION SWITCH**  
Test, page 23-130  
Replacement, page 23-131

**ECM**  
(Located at the right side of the front floor)  
See Fuel and Emissions, section 11



**TRANSMISSION CONTROL  
MODULE (TCM)**  
See Automatic Transmission,  
section 14

**S4 SWITCH**  
See Automatic  
Transmission,  
section 14



## Description

### **S<sub>3</sub>/S<sub>4</sub> indicator:**

The **S<sub>3</sub>** indicator light will remain on for about two seconds after the ignition switch has been turned on to show that the system circuit is functioning.

The A/T gear position indicator is dimmed by the dimming circuit with the combination light switch on, and is also controlled by the dash lights brightness controller.

In the **S<sub>3</sub>** mode, the transmission control module (TCM) applies voltage to the "D10" terminal of the A/T gear position indicator to light up the **S<sub>3</sub>** indicator.

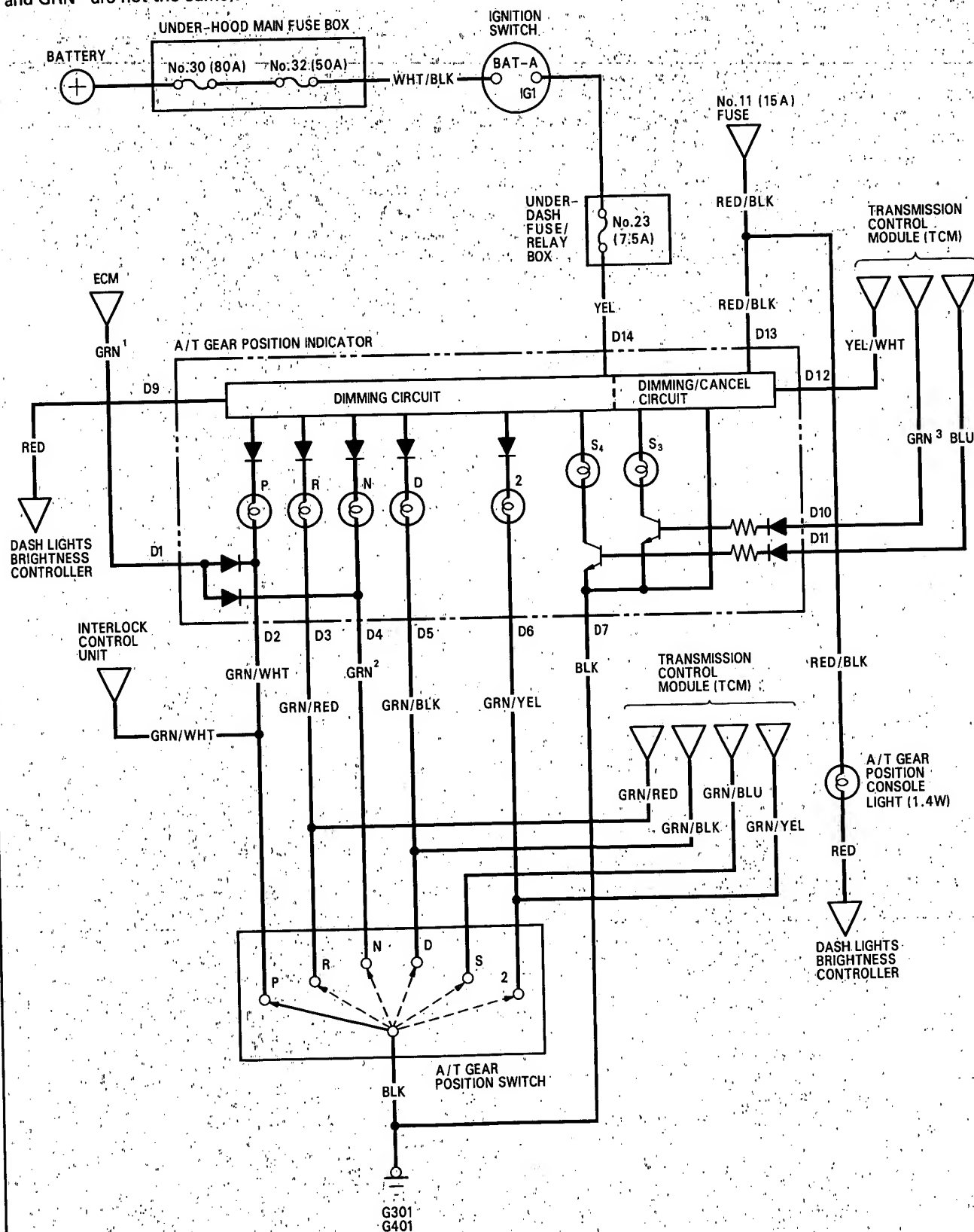
In the **S<sub>4</sub>** mode, which can be selected by the **S<sub>4</sub>** switch, the TCM applies voltage to the "D11" terminal of the A/T gear position indicator to light up the **S<sub>4</sub>** indicator.

The **S<sub>3</sub>** indicator also functions as the warning indicator for the A/T control system. If some malfunction occurs in the A/T control system, the TCM applies voltage to the "D10" terminal of the A/T gear position indicator to make the **S<sub>3</sub>** indicator flash. The flashing **S<sub>3</sub>** indicator informs the driver of some malfunction in the A/T control system. When the **S<sub>3</sub>** indicator functions as the warning indicator, the TCM sends a canceling signal to the "D12" terminal of the A/T gear position indicator so that the **S<sub>3</sub>** indicator light is not dimmed.

# A/T Gear Position Indicator

## Circuit Diagram

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, GRN<sup>1</sup> and GRN<sup>2</sup> are not the same).





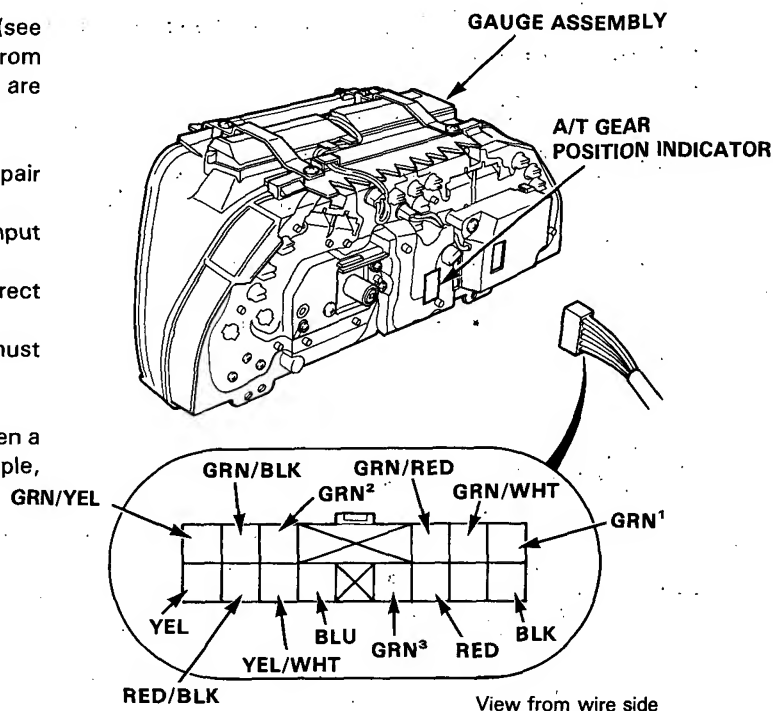


## Indicator Input Test

Remove the gauge assembly from the dashboard (see page 23-115), and disconnect the 14-P connector from it. Inspect the connector terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector.
  - If any test indicates a problem, find and correct the cause, then recheck the system.
  - If all the input tests prove OK, the indicator must be faulty; replace the gauge assembly.

**NOTE:** Wires with the same color have been given a number suffix to distinguish them (for example, GRN<sup>1</sup> and GRN<sup>2</sup> are not same).



No.	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
2	YEL	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No.23 (7.5A) fuse. (in the under-dash fuse box)</li> <li>• An open in the wire.</li> </ul>
3	GRN/WHT	Shift lever in position <b>P</b> . NOTE: Don't push the brake pedal.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty A/T gear position switch.</li> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
	GRN/RED	Shift lever in position <b>R</b> .		
	GRN <sup>2</sup>	Shift lever in position <b>N</b> .		
	GRN/BLK	Shift lever in position <b>D</b> .		
	GRN/YEL	Shift lever in position <b>2</b> .		
4	RED/BLK and RED	Combination Light switch ON and dash lights brightness control dial on full bright.	Check for voltage between RED/BLK and RED terminals: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Faulty dash lights brightness control system.</li> <li>• An open in the wire.</li> </ul>
5	GRN <sup>1</sup>	Ignition switch ON.	Check for voltage to ground: There should be about 10 V.	<ul style="list-style-type: none"> <li>• Faulty ECM.</li> <li>• An open in the wire.</li> </ul>
6	BLU or GRN <sup>3</sup>	Ignition switch ON and shift lever in position <b>S</b> .	Check for voltage to ground: There should be battery voltage or no voltage alternately between the BLU or GRN <sup>3</sup> terminal and ground when the S <sub>4</sub> switch is pressed repeatedly.	<ul style="list-style-type: none"> <li>• Faulty transmission control module (TCM).</li> <li>• Faulty S<sub>4</sub> switch.</li> <li>• An open in the wire.</li> </ul>
7	YEL/WHT	Ignition switch ON.	Check for voltage between the YEL ⊕ and YEL/WHT ⊖ terminals: There should be less than 1 V for two seconds after the ignition has been switched ON, and more than 10 V after these two seconds.	<ul style="list-style-type: none"> <li>• Faulty TCM.</li> <li>• An open in the wire.</li> </ul>

# A/T Gear Position Indicator

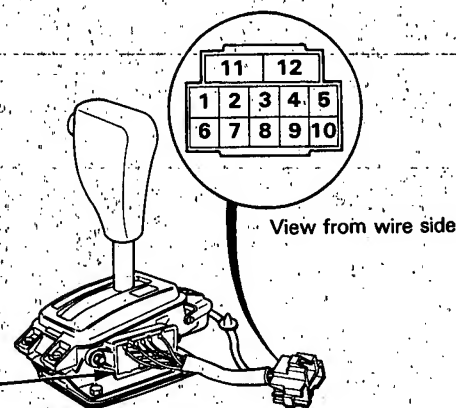
## A/T Gear Position Switch Test

1. Remove the console, then disconnect the 10-P and 2-P connectors from the switch.
2. Check for continuity between the terminals in each position according to the table.

### NOTE:

- Move the lever back and forth without touching the push button at each switch position, and check for continuity within the range of free play of the shift lever.
- If there is no continuity, adjust the installation position of the switch.

A/T GEAR POSITION SWITCH



A/T Gear Position Switch

Terminal	1	7	8	9	10	5	4	6	2	3	11	12
Position												
2	○	○	○									
S	○	○		○								
D	○	○			○							
N		○				○					○	○
R		○					○		○	○		
P		○						○			○	○

Back-up  
Light Switch

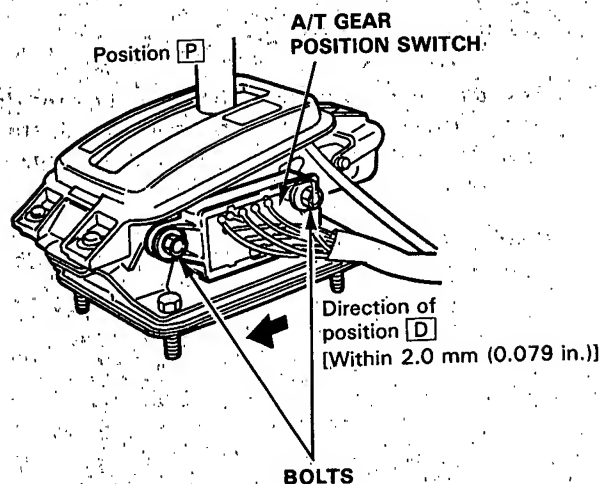
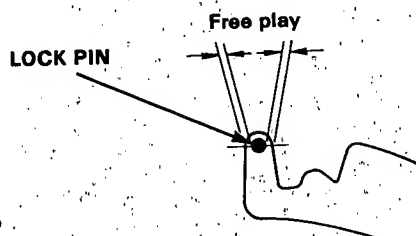
Neutral  
Position Switch

### Adjustment:

1. Shift to position **P**, and loosen the bolts.
2. Slide the switch in the direction of position **D** [within 2.0 mm (0.079 in.)] so that there is continuity between No. 6 and No. 7 terminals in the range of free play of the shift lever.
3. Recheck for continuity between each of the terminals.

### NOTE:

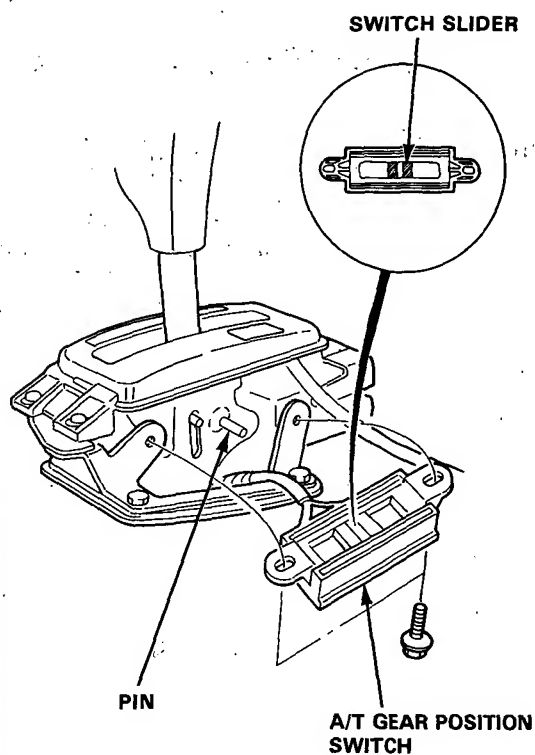
- If adjustment is not possible, check for damage to the shift lever detent and/or the bracket. If there is no damage, replace the switch.
- The engine should start when the shift lever is in position **P** in the range of free play.





## A/T Gear Position Switch Replacement

1. Remove the console, then disconnect the 10-P and 2-P connectors from the switch.
2. Remove the two switch mounting bolts.



3. Position the switch slider to "Neutral" as shown above.
4. Shift the lever to "Neutral", then slip the switch into position.
5. Attach the switch with the two bolts.
6. Test the switch with the shift lever in position **P** and **N** (see page 23-130). The engine should start when the shift lever is in position **N** in the range of free play.
7. Connect the 10-P and 2-P connectors, clamp the harness, and install the console.

### Circuit Diagram

An integrated control unit, located on the left kick panel, integrates the functions of the brake bulb check (brake system light), seat belt and key-in reminder, side marker light flasher, intermittent wiper relay, lights-on reminder, rear window defogger timer, and oil pressure warning flasher circuits onto one circuit board, sharing common circuit functions.

**BATTERY**

**UNDER-HOOD MAIN FUSE BOX**

- No. 30 (80A)
- No. 32 (50A)
- No. 34 (7.5A:USA) (10A:Canada)
- No. 33 (50A)

**IGNITION SWITCH**

- ST
- BAT-A
- I&I

**COMBINATION LIGHT SWITCH**

- RED/GRN
- WHT

**UNDER-DASH FUSE/RELAY BOX**

- No. 11 (15A)
- No. 14 (15A)
- No. 16 (20A)
- No. 23 (7.5A)

**HAZARD LIGHTS / TURN SIGNAL / HAZARD WARNING RELAY**

- ECM
- TRANSMISSION CONTROL MODULE (TCM)
- AUTOMATIC SHOULDER SEAT BELT CONTROL UNIT (USA)

**WINDSHIELD WIPER/WASHER SWITCH**

- WASHER SWITCH
- INT
- AS

**TURN SIGNAL/HAZARD WARNING SWITCH**

- LEFT
- RIGHT

**IGNITION KEY SWITCH**

- BLU/WHT<sup>3</sup>

**AUTOMATIC SHOULDER SEAT BELT CONTROL UNIT (USA)**

- YEL/RED

**SEAT BELT REMINDER LIGHT**

**BEOPER**

**INTERMITTENT WIPER RELAY**

**SIDE MARKER FLASHER RELAY**

**SEAT BELT/KEY-IN REMINDER CIRCUIT**

**CEILING LIGHT**

**FRONT PASSENGER'S DOOR SWITCH**

**DRIVER'S DOOR SWITCH**

**DRIVER'S SEAT BELT SWITCH**

**WINDSHIELD WIPER MOTOR**

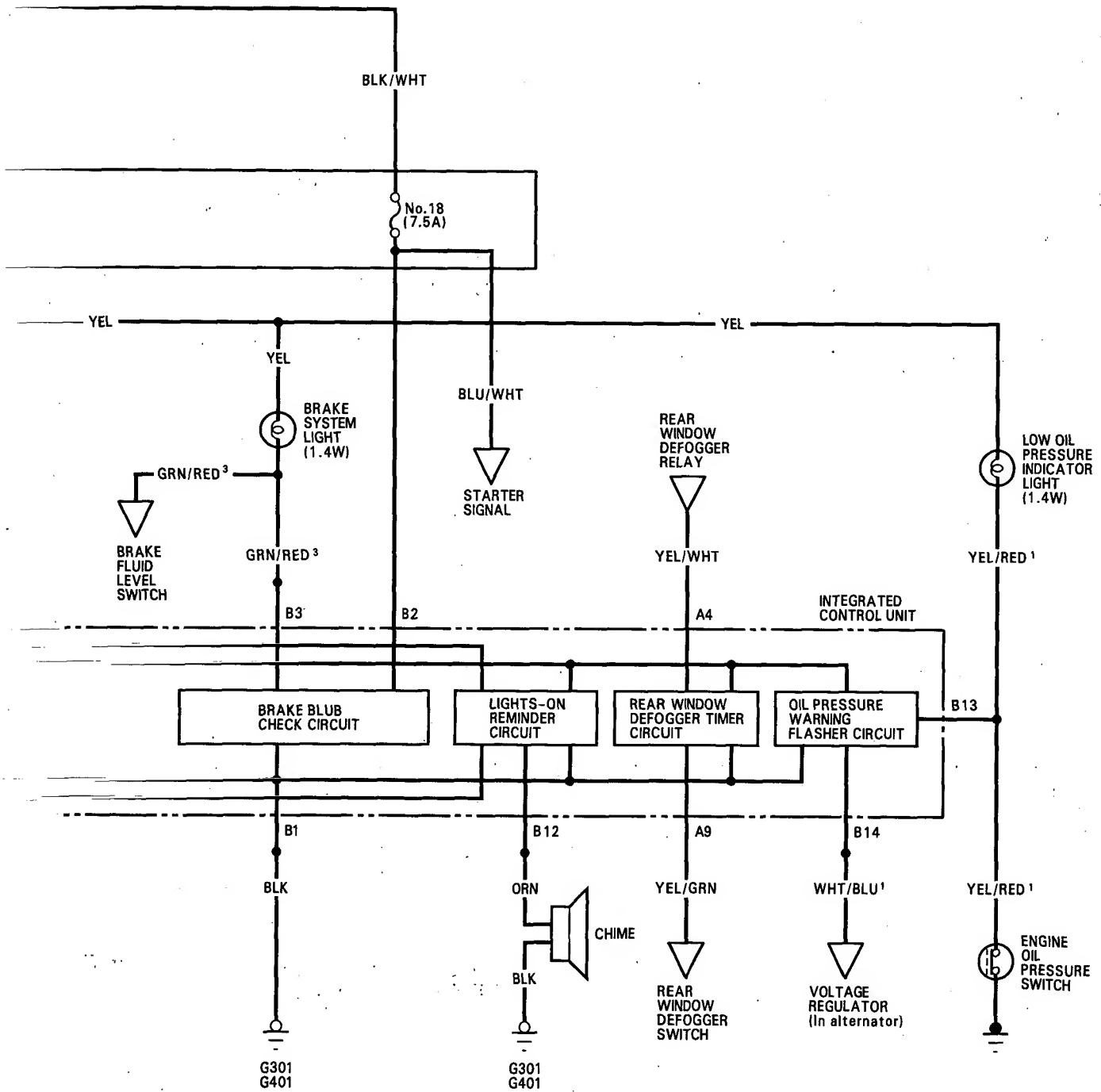
**G301 G401**

**G201**

**G521 (Hatchback) G552 (Sedan)**

**(Canada)**

\*:Canada



# Integrated Control Unit

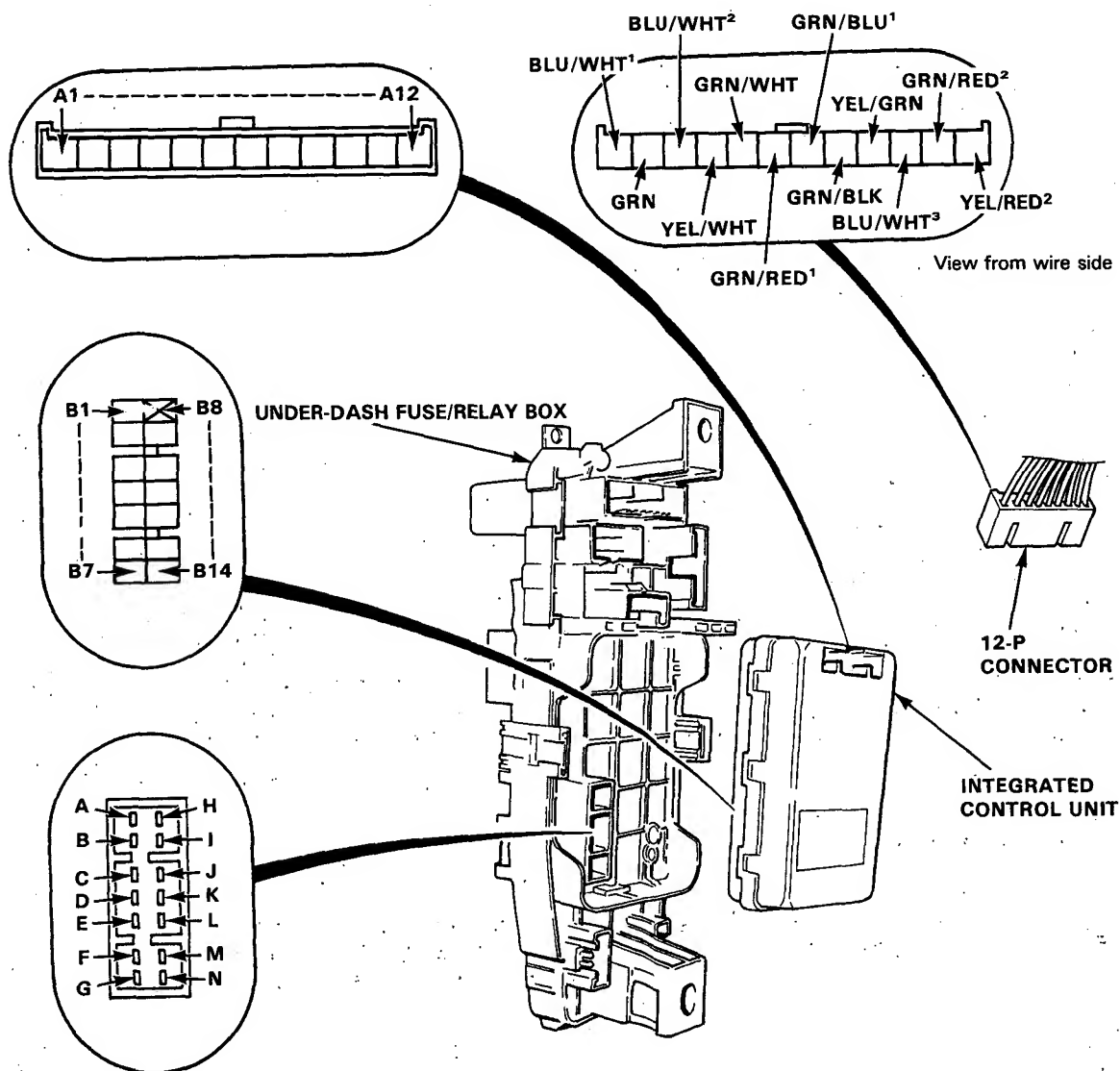
## Input Test

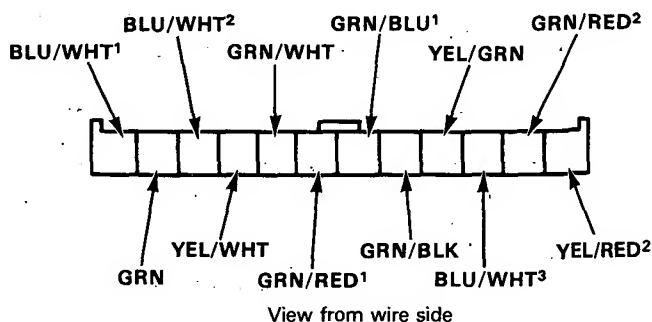
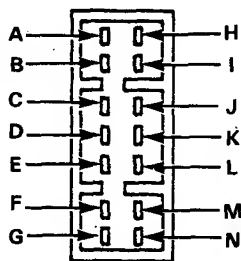
Remove the left kick panel, then disconnect the 12-P connector from the integrated control unit. Next, remove the integrated control unit from the under-dash fuse/relay box. Inspect the connector and socket terminals to be sure they are all making good contact.

- If any terminals are bent, loose or corroded, repair as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector and socket.
  - If any test indicates a problem, find and correct the cause, then recheck the system.
  - If all the input tests prove OK, the control unit must be faulty; replace it.

### NOTE:

- Different wires the same color have been given a number suffix to distinguish them (for example, BLU/WHT<sup>1</sup> and BLU/WHT<sup>2</sup> are not the same).
- Do not disconnect any connectors from the under-dash fuse/relay box except the one on the integrated control unit.





#### Intermittent Wiper Relay Circuit:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	H	Under all conditions.	Check for continuity to ground: There should be continuity.	• Poor ground (G301, G401).
2	BLU/WHT <sup>1</sup> and BLU/WHT <sup>2</sup>	Windshield wiper switch at OFF or INT and wiper blades in park position.	Check for continuity between the BLU/WHT <sup>1</sup> and BLU/WHT <sup>2</sup> terminals: There should be continuity.	• Faulty windshield wiper switch. • Faulty windshield wiper motor. • An open in the wire.
3	GRN	Ignition switch ON and windshield wiper switch at INT.	Check for voltage to ground: There should be battery voltage.	• Blown No.16 (20A) fuse. (in the under-dash fuse/relay box) • Faulty windshield switch. • An open in the wire.
*4	GRN/BLK	Ignition switch ON and washer switch ON.	Check for voltage to ground: There should be battery voltage.	• Blown No.16 (20A) fuse. • Faulty washer switch. • An open in the wire.
*5	C	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	• Blown No.16 (20A) fuse. • An open in the wire.

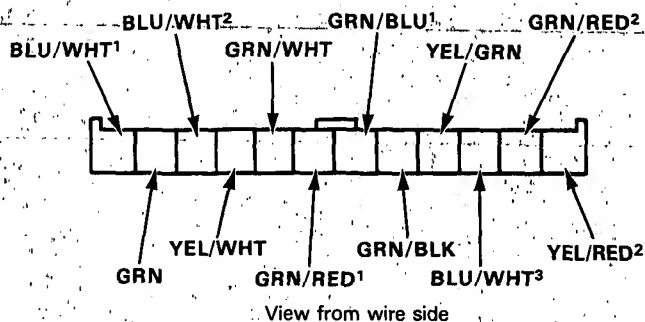
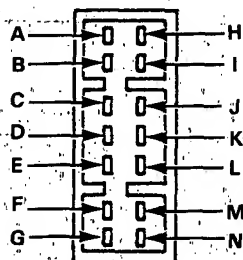
#### Side Marker Light Flasher System:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	H	Under all conditions.	Check for continuity to ground: There should be continuity.	• Poor ground (G301, G401). • An open in the wire.
2	M	Under all conditions.	Check for voltage to ground: There should be battery voltage.	• Blown No.14 (15A) fuse. (in the under-dash fuse/relay box) • An open in the wire.
3	N	Headlight switch ON.	Check for voltage to ground: There should be battery voltage.	• Blown No.11 (15A) fuse. (in the under-dash fuse/relay box) • Faulty combination light switch. • An open in the wire.
4	D	Ignition switch ON and turn signal switch in left position.	Check for voltage to ground: It should be 0—12—0—12 repeatedly.	• Blown No. 1 (10 A) fuse (in the under-dash fuse/relay box) • Faulty turn signal system. • An open in the wire.
5	K	Ignition switch ON and turn signal switch in right position.		
6	GRN/WHT	Connect the M terminal to the GRN/WHT (or GRN/RED <sup>1</sup> ) terminal.	Check marker light operation: The left (or right) front side marker light should come on as the battery is connected.	• Blown bulb. • Poor ground (G201), (G301, G401) • An open in the wire.
7	GRN/RED <sup>1</sup>			

\*: Canada (With combined operation wiper/washer)

# Integrated Control Unit

## Input Test (cont'd)



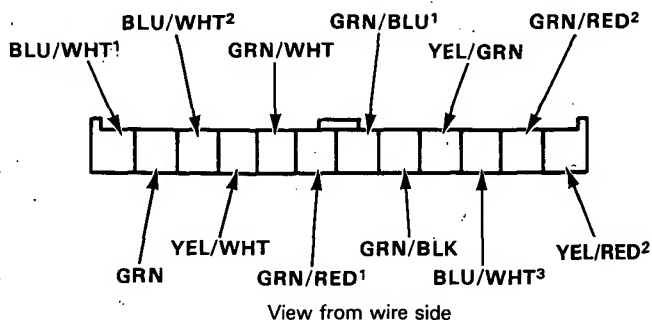
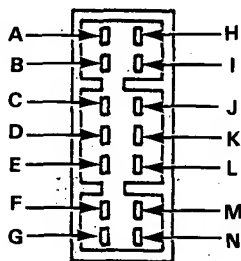
### Seat Belt Reminder (Canada) and Key-in Remainder:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	H	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
2	B	Ignition switch to ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 23 (7.5 A) fuse. (in the under-dash fuse/relay box)</li> <li>• An open in the wire.</li> </ul>
3	GRN/BLU <sup>1</sup> or GRN/RED <sup>2</sup>	Right or left door open.	Check for continuity to ground: There should be continuity. NOTE: Before testing, remove No. 14 (15 A) fuse (on GS and GSR models: get the anti-theft radio code first).	<ul style="list-style-type: none"> <li>• Faulty right or left door switch.</li> <li>• An open in the wire.</li> </ul>
4	BLU/WHT <sup>3</sup>	Ignition switch turned from "II" to "O" position.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Faulty ignition key switch.</li> <li>• An open in the wire.</li> </ul>
*5	YEL/RED <sup>2</sup>	Driver's seat belt is not buckled.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty seat belt switch.</li> <li>• Poor ground (Hatchback: G521, Sedan G552).</li> <li>• An open in the wire.</li> </ul>
*6	L			

### Brake Bulb Check System:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	H	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
2	I	Ignition switch to "III" position.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 18 (7.5 A) fuse. (in the under-dash fuse/relay box)</li> <li>• An open in the wire.</li> </ul>
3	J	Ignition switch to ON, brake fluid reservoir full, and parking brake lever down.	Connect to ground: Brake system light should come on.	<ul style="list-style-type: none"> <li>• Blown No. 23 (7.5 A) fuse.</li> <li>• Blown brake system light.</li> <li>• An open in the wire.</li> </ul>





#### Lights-on Reminder

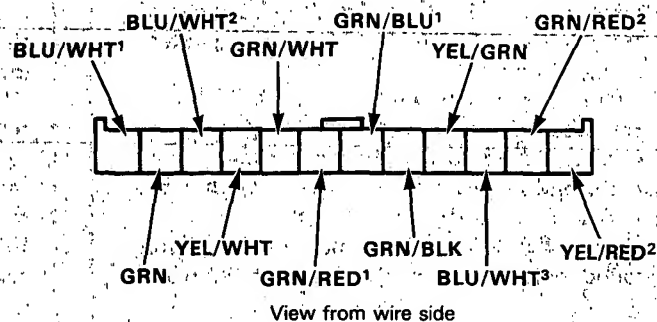
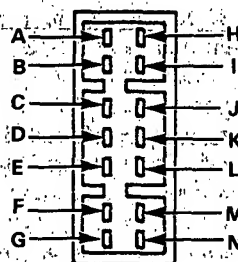
No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	H	Under all conditions.	Check for continuity to ground: There should be continuity.	• Poor ground (G301, G401).
2	N	Headlight switch to On.	Check for voltage to ground: There should be battery voltage.	• Blown No. 11 (15 A) fuse. (in the under-dash fuse/relay box) • Faulty combination light switch. • An open in the wire.
3	B	Ignition switch to ON.	Check for voltage to ground: There should be battery voltage.	• Blown No. 23 (7.5 A) fuse. (in the under-dash fuse/relay box) • An open in the wire.
4	GRN/BLU¹ or GRN/RED²	Right or left door open.	Check for continuity to ground: There should be continuity. NOTE: Before testing, remove No. 14 (15 A) fuse (on GS and GSR models: get the anti theft radio code first).	• Faulty right or left door switch. • An open in the wire.
5	E	Ignition switch to ON and the B terminal connected to the E terminal.	Check chime operation: The chime should activate each time the battery is connected.	• Faulty chime. • An open in the wire.

#### Rear Window Defogger Timer Circuit:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	H	Under all conditions.	Check for continuity to ground: There should be continuity.	• Poor ground (G301, G401).
2	YEL/GRN	Defogger switch pushed.	Check for continuity to ground: There should be continuity as the switch is pushed.	• Faulty defogger switch. • Poor ground (G301, G401). • An open in the wire.
3	YEL/GRN	Ignition switch to ON.	Connect to ground: The rear window defogger should work and the defogger switch indicator light should come on.	• Blown No. 17 (7.5 A) fuse. (in the under-dash fuse/relay box) • Faulty defogger relay. • Blown bulb. • An open in the wire.
4	B	Ignition switch to ON.	Check for voltage to ground: There should be battery voltage.	• Blown No. 23 (7.5 A) fuse. • An open in the wire.

# Integrated Control Unit

## Input Test (cont'd)



### Oil Pressure Indicator Flasher System:

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	H	Under all conditions.	Check for continuity to ground: There should be continuity.	• Poor ground (G301, G401).
2	B	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	• Blown No.23 (7.5A) fuse. (in the under-dash fuse/relay box) • An open in the wire.
3	G	Engine running.	Check for voltage to ground: There should be battery voltage.	• Faulty charging system. • An open in the wire.
4	F	Ignition switch OFF.	Check for continuity to ground: There should be continuity.	• Faulty engine oil pressure switch. • An open in the wire.
		Ignition switch ON.	Check light operation. If the light does not come on, connect the YEL/RED terminal to ground: Light should come on as the ignition switch is turned ON.	• Blown bulb. • An open in the wire.
		Start the engine.	Check for voltage to ground: There should be battery voltage.	• Insufficient oil. • Improper lubrication. • Faulty engine oil pressure switch.

## Key-in Reminder

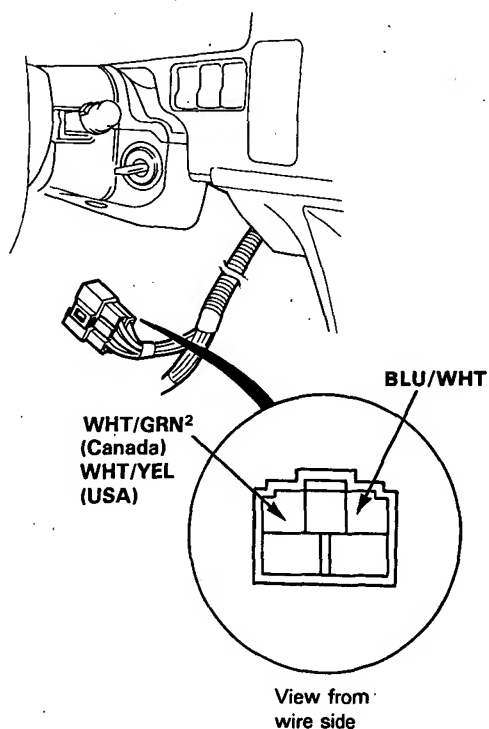
### Ignition Key Switch Test

NOTE: Refer to page 23-132 for the circuit diagram of the key-in reminder, and page 23-136 for the input test of the reminder circuit.

When the ignition key is turned from "II" to "O" position but not removed, voltage is applied through the No. 34 (7.5 A: USA, 10 A: Canada) fuse in the under-hood main fuse box and the closed ignition key switch to the key-in reminder in the integrated control unit.

When you open the driver's door, the reminder circuit senses ground through the closed door switch. With voltage at the "A10" terminal and ground at the "A7" terminal, the beeper sounds.

1. Remove the dashboard lower cover and left knee bolster, then disconnect the 5-P connector from the main wire harness.
2. There should be continuity between the BLU/WHT and WHT/GRN terminals when the ignition switch is turned from "II" to "O" position. There should be no continuity when the ignition key is removed.



## Lights-on Reminder

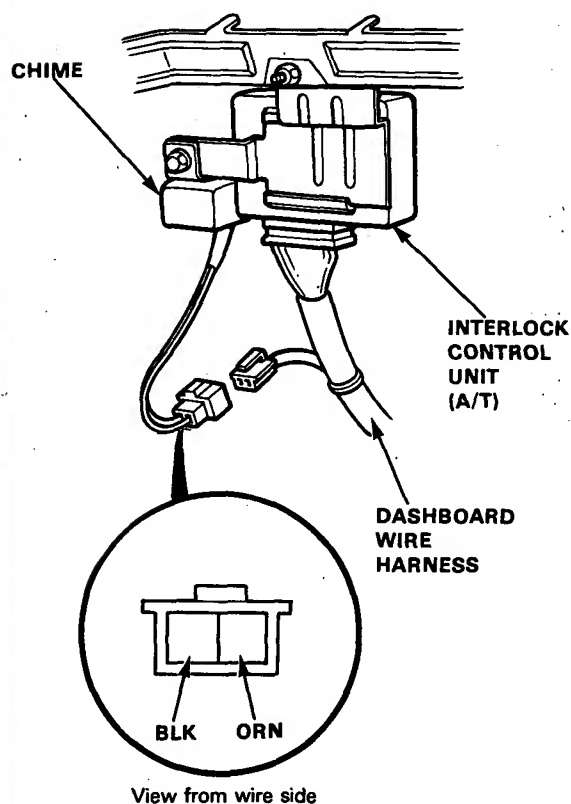
### Chime Test

NOTE: Refer to page 23-133 for the circuit diagram of the lights-on reminder circuit, and page 23-137 for the input test of the reminder circuit.

When the ignition key is turned to the "O" position and removed, with the lights on, voltage is applied to the reminder circuit on the integrated control unit. When you open the driver's door, the warning circuit senses ground through the closed door switch.

With voltage at the "B7" terminal, ground at the "A7" terminal and no voltage at the "B9" terminal, the chime is activated to remind the driver to turn off the lights.

1. Remove the front console to disconnect the 2-P connector from the dashboard wire harness.
2. Test chime operation by connecting battery power to the ORN terminal, and ground to the BLK terminal, and cycling the power on-off repeatedly.
3. If the chime fails to sound every time power is cycled, replace it.



# Engine Oil Pressure Indicator System

## Description

**NOTE:** Refer to page 23-133 for the circuit diagram of the oil pressure indicator flasher, and page 23-138 for the input test of the flasher circuit.

The low oil pressure indicator light works in two ways. It will flash continuously following a momentary loss of oil pressure, or it will go on and stay on with a complete loss of oil pressure.

When the engine first starts, before oil pressure rises above 30 kPa (0.3 kg/cm<sup>2</sup>, 4.3 psi), current flows through the low oil pressure indicator light and the engine oil pressure switch to ground.

With the engine running, voltage is applied to the flasher circuit of the integrated control unit. With normal oil pressure, the engine oil pressure switch is open and the low oil pressure indicator light does not operate. If the oil pressure switch closes momentarily (more than 0.5 seconds), but then opens again, terminal "B13" will sense ground through the switch. The integrated control unit will then provide and remove ground for the low oil pressure indicator light through terminal "B13". The light will flash on and off until the ignition switch is turned to "Off".

If engine oil pressure falls below 30 kPa (0.3 kg/cm<sup>2</sup>, 4.3 psi) and does not increase, the engine oil pressure switch will stay closed. The low oil pressure indicator light will go on and stay on.

## Engine Oil Pressure Switch Test

1. Remove the YEL/RED wire from the engine oil pressure switch.
2. There should be continuity between the positive terminal and the engine (ground) with the engine stopped. There should be no continuity when the engine runs.

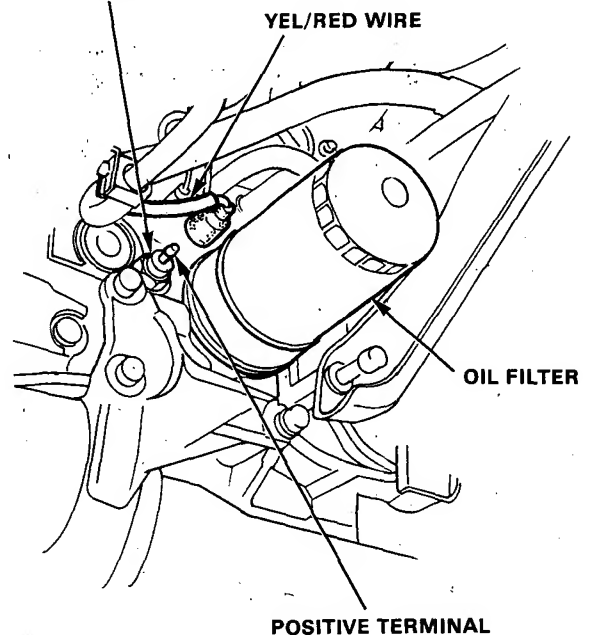
### ENGINE OIL PRESSURE SWITCH

18 N·m (1.8 kg-m, 13 lb-ft)

1/8 in. BSP (British Standard

Pipe Taper) 28 Threads/inch.

Use proper liquid sealant.

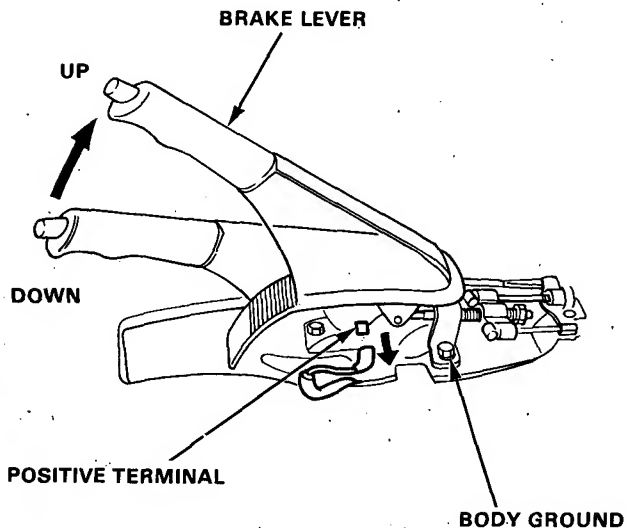


3. If the switch fails to operate, check the engine oil level. If the engine oil level is correct, check the engine oil pump pressure (see section 8).

# Brake Warning System

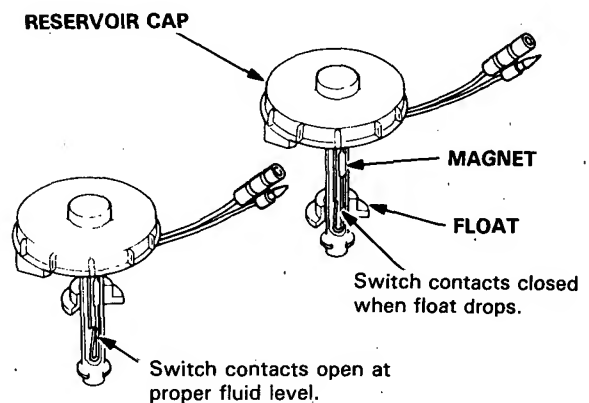
## Parking Brake Switch Test

1. Remove the center console and disconnect the connector from the switch.
2. There should be continuity between the positive terminal and body ground with the brake lever up. There should be no continuity with the brake lever down.



## Brake Fluid Level Switch Test

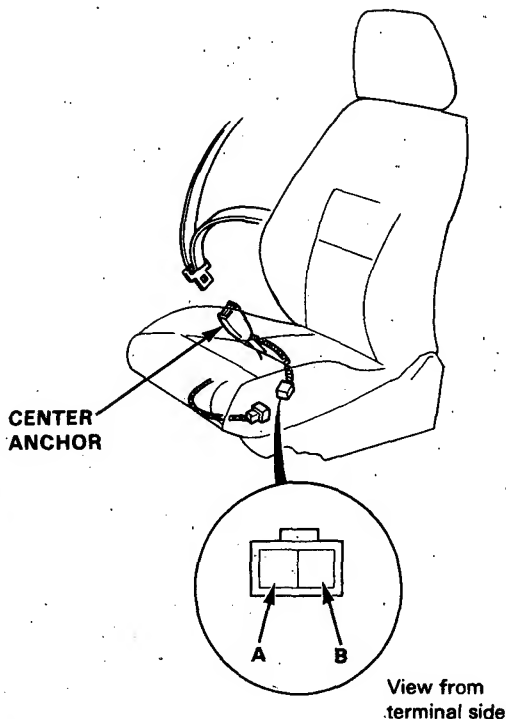
1. Remove the reservoir cap. Check that the float moves up and down freely. Replace the reservoir cap assembly if the float does not move freely.
2. Check for continuity between the terminals with the float up and down. There should be continuity with the float down and no continuity with the float up. Replace the reservoir cap assembly if necessary.



## Seat Belt Reminder

### Seat Belt Switch Test

1. Slide the drivers seat forward until the seat belt center anchor bolt is accessible, then disconnect the 2-P connector from the seat belt switch.
2. There should be continuity between the A and B terminals when the driver's seat belt is not buckled. There should be no continuity when the driver's seat belt is buckled.



## Low Fuel Indicator System

### Indicator Light Test

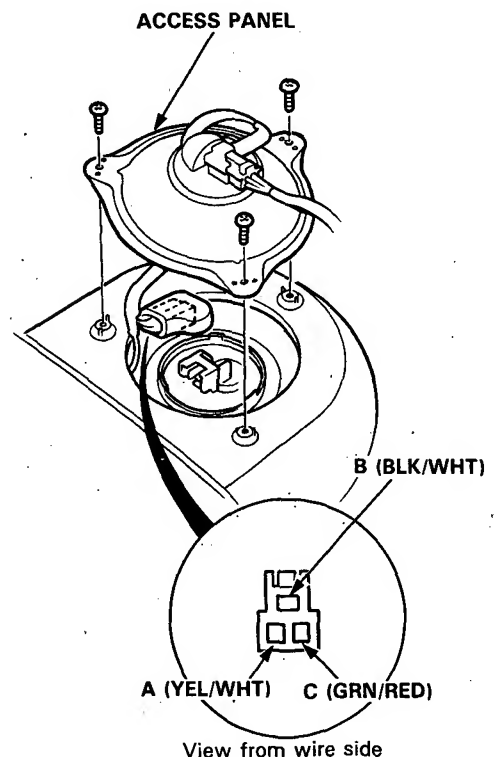
NOTE: Refer to page 23-112 for the diagram of the low fuel indicator circuit.

1. Park the car on level ground.

**⚠ WARNING** Do not smoke while working on the fuel system. Keep open flame away from the work area. Drain fuel only into an approved container.

2. Drain the fuel tank into an approved container. Then install the drain bolt with a new washer.
3. Add less than 11 l (2.9 U.S. Gal, 2.4 Imp. Gal) of fuel and turn the ignition switch on. The low fuel indicator light should come on within four minutes.
4. Then add approx. 4l (1.1 U.S. Gal, 0.9 Imp. Gal) of fuel.

- The light should go off within four minutes.
- If the light did not come on in step 3, remove the access panel and disconnect the 3-P connector from the fuel gauge sending unit. Connect the C (GRN/RED) terminal to the B (BLK/WHT) terminal with a jumper wire.
- If the light comes on, the problem is either the sending unit or its ground.
- If the light does not come on, the problem is an open in the GRN/RED wire to the gauge assembly, no power to the gauge, or a bad bulb.

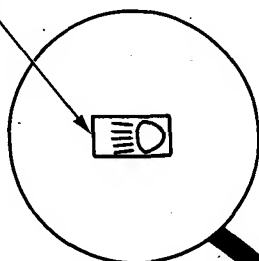


# Lighting System



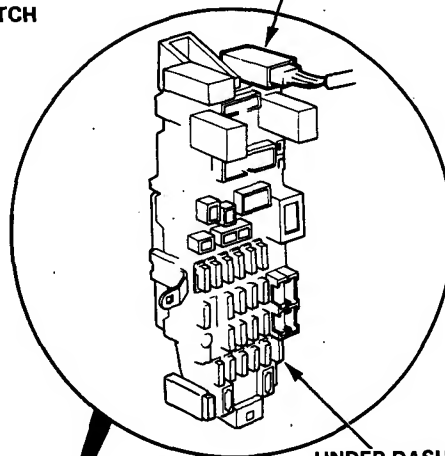
## Component Location Index

**HIGH BEAM  
INDICATOR LIGHT**  
(In the gauge assembly)  
Gauge Assembly, page 23-110



**COMBINATION LIGHT SWITCH**  
Test, page 23-147  
Replacement, page 23-148

**FRONT FOG LIGHT RELAY**  
Test, page 23-149



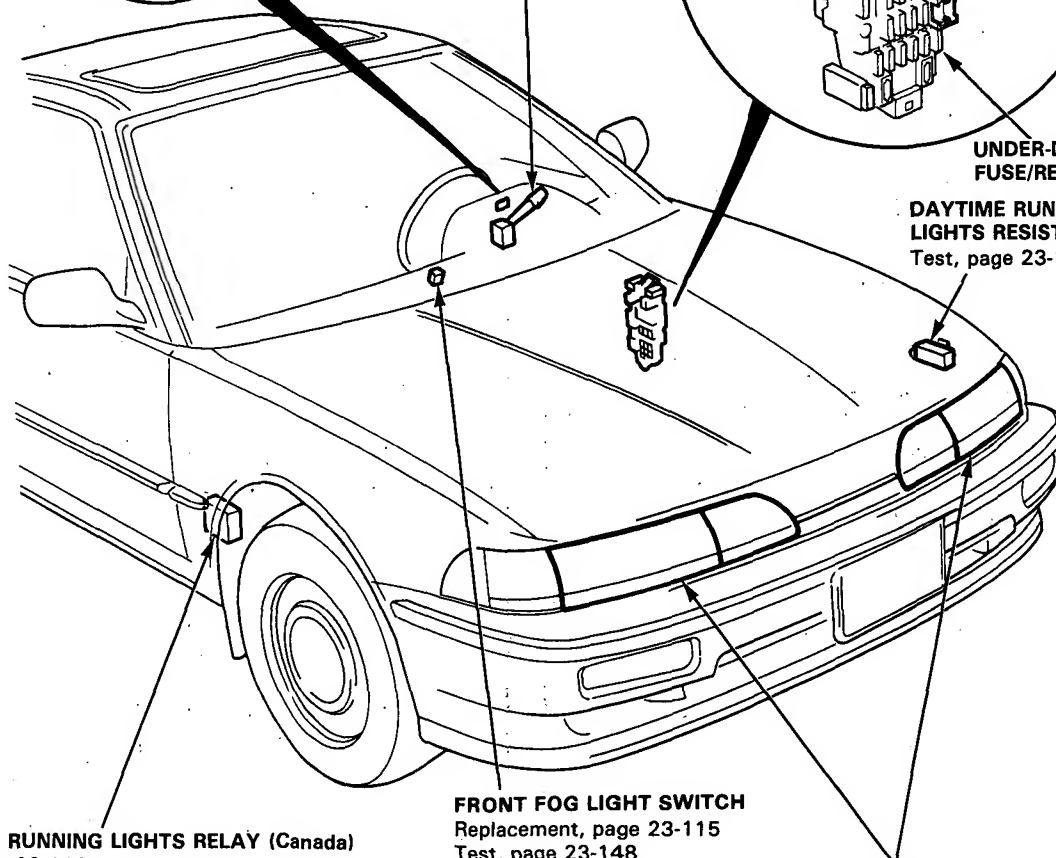
**UNDER-DASH  
FUSE/RELAY BOX**

**DAYTIME RUNNING  
LIGHTS RESISTOR (Canada)**  
Test, page 23-149

**DAYTIME RUNNING LIGHTS RELAY (Canada)**  
Test, page 23-146

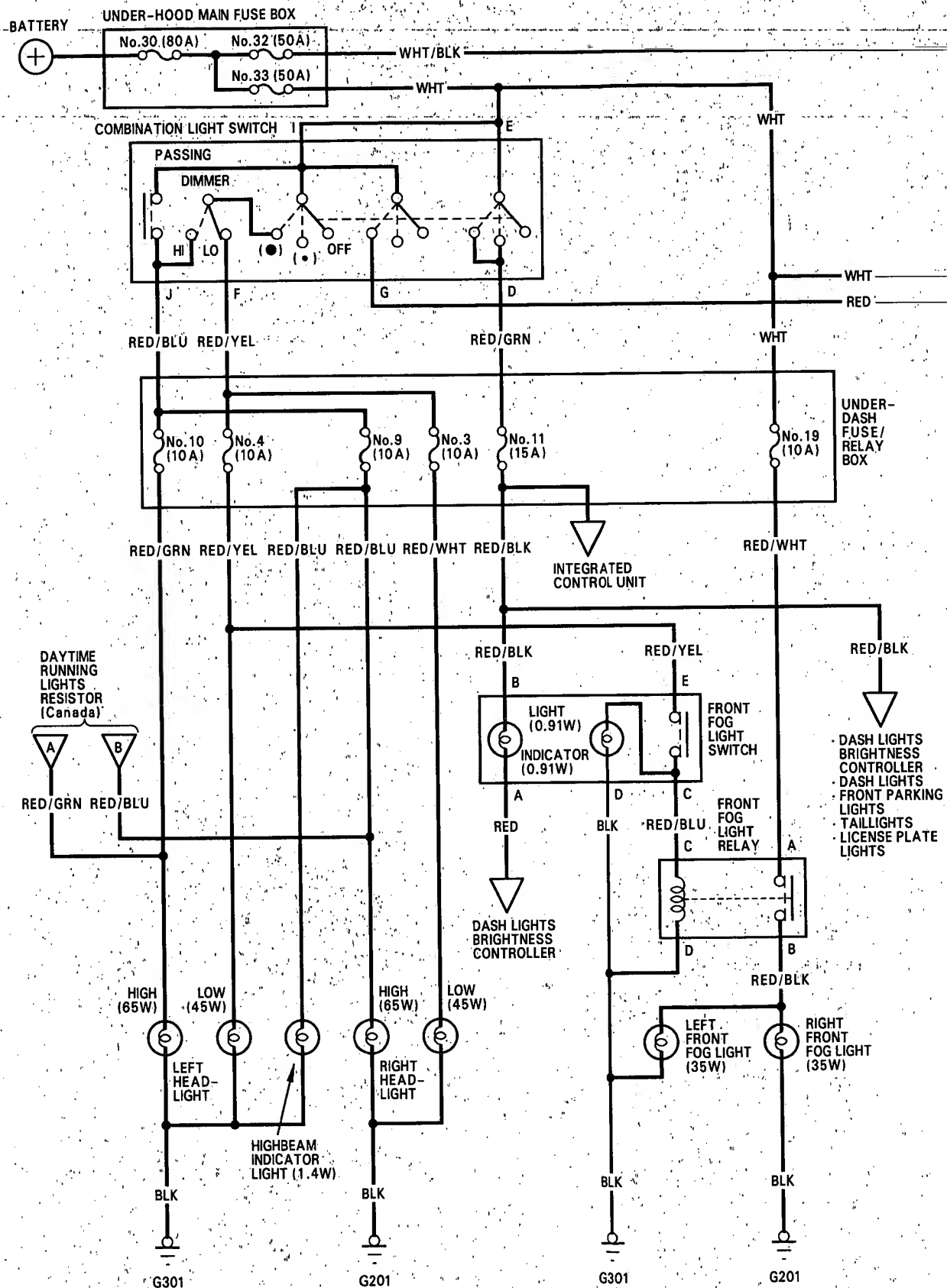
**FRONT FOG LIGHT SWITCH**  
Replacement, page 23-115  
Test, page 23-148

**HEADLIGHTS/FRONT FOG LIGHTS**  
Adjustment, page 23-150  
Replacement, page 23-150, 151

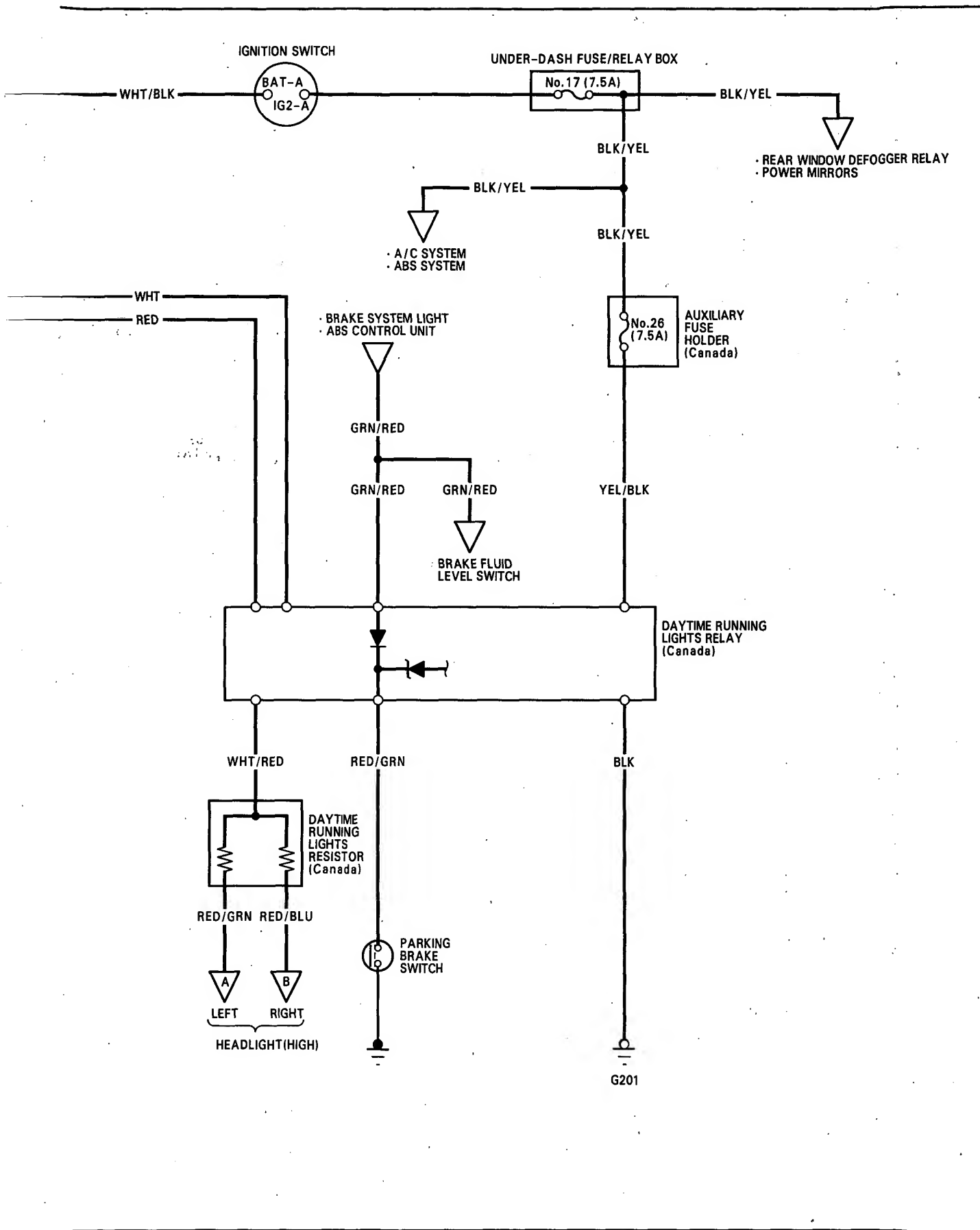


# Lighting System

## Circuit Diagram







# Lighting System

## Daytime Running Lights Relay Input Test (Canada)

1. Remove the right side kick panel, then disconnect the connectors from the daytime running lights relay.

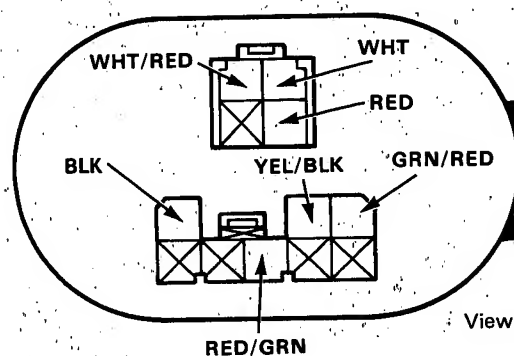
2. Inspect the connector and socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.

- If the terminals look OK, make the following input tests at the connectors.

- If any test indicates a problem, find and correct the cause, then recheck the system.

- If all input tests prove OK, the daytime running lights relay must be faulty; replace it.



4-P CONNECTOR

DAYTIME RUNNING LIGHTS RELAY

8-P CONNECTOR

View from wire-side

No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G201)</li> <li>• An open in the wire.</li> </ul>
2	YEL/BLK	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 26 (7.5A) fuse. (in the auxiliary fuse holder)</li> <li>• An open in the wire.</li> <li>• Faulty ignition switch.</li> </ul>
3	WHT	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 33 (50A) fuse. (in the under-hood main fuse box)</li> <li>• An open in the wire.</li> </ul>
4	RED	Headlight switch in "●" and dimmer switch in HI position.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 33 (50A) fuse.</li> <li>• An open in the wire.</li> </ul>
5	WHT/RED	Connect a jumper wire between the YEL/BLK and the WHT/RED terminals, then turn the ignition switch ON.	Right headlight (High) and high beam indicator light should come on.	<ul style="list-style-type: none"> <li>• Blown No. 33 (50A) fuse.</li> <li>• An open in the wire.</li> <li>• Faulty combination light switch.</li> <li>• Faulty daytime running lights relay.</li> </ul>
6	GRN/RED	Ignition switch is ON, brake fluid reservoir is full, and parking brake lever down.	Connect to ground: The brake system light should come on.	<ul style="list-style-type: none"> <li>• Blown No. 23 (7.5A) fuse. (in the under-dash fuse/relay box)</li> <li>• An open in the wire.</li> <li>• Blown brake system light.</li> </ul>
7	RED/GRN	Parking lever up.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Faulty parking brake switch.</li> <li>• An open in the wire.</li> </ul>

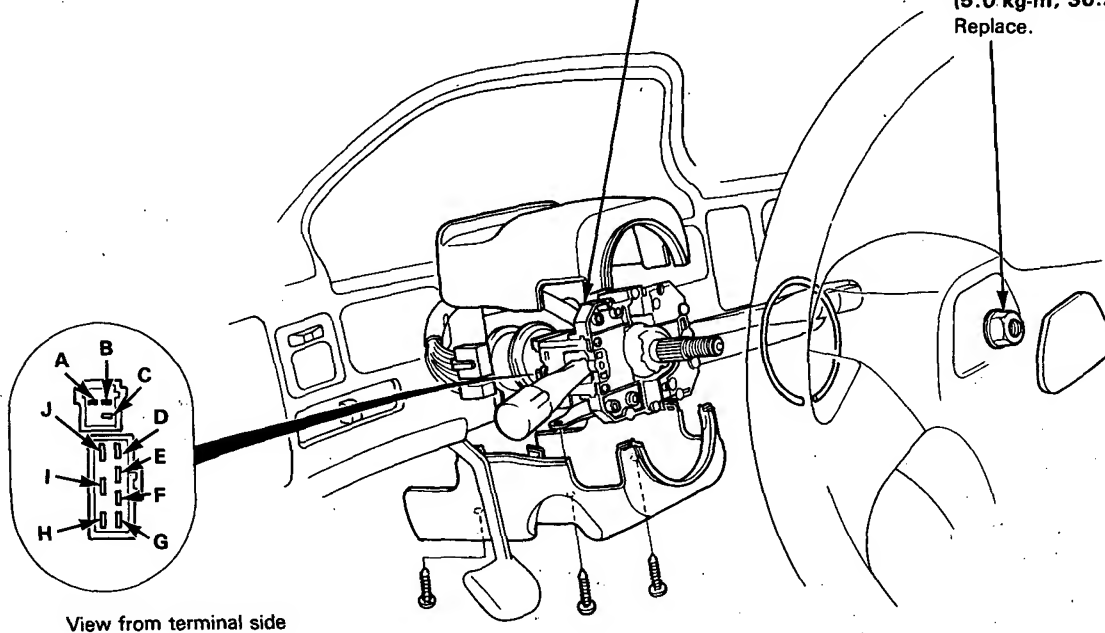


## Lighting /Turn Signal Switch Test

1. Remove the steering wheel and the steering column covers.
2. Disconnect the 7-P and 4-P connectors from the switch.
3. Check for continuity between the terminals in each switch position according to the tables.

**LIGHTING/DIMMER/PASSING  
TURN SIGNAL SWITCH**

**SELF-LOCKING  
NUT 50 N·m  
(5.0 kg-m, 36.2 lb-ft)  
Replace.**



View from terminal side

### Lighting/Dimmer/Passing Switch

Terminal		D	E	F	G	I	J
Position							
Head-light switch	OFF						
	•	○	○				
	•	○	○	○		○	
Passing switch	LOW	○	○				
	HIGH	○	○		○	○	○
	OFF						
ON						○	○

----- : (Canada)

### Turn Signal Switch

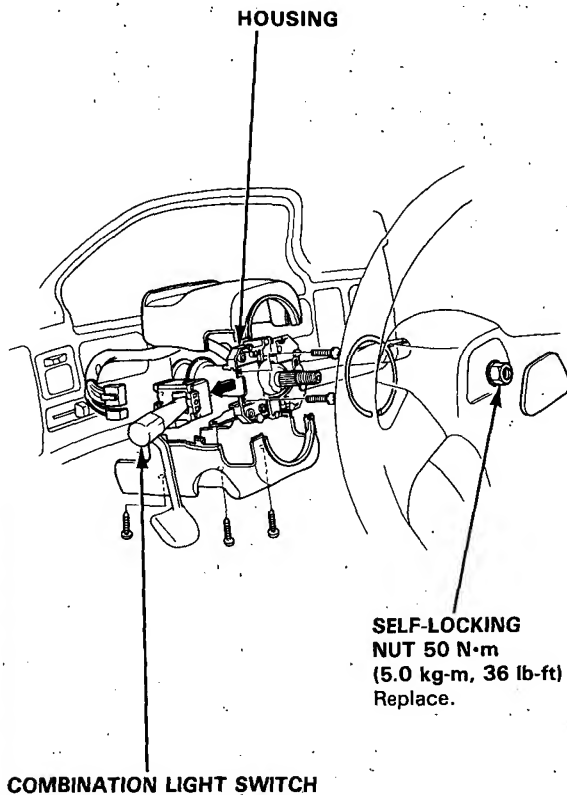
Terminal		A	B	C
Position				
RIGHT		○		○
NEUTRAL				
LEFT		○	○	

# Lighting System

## Combination Light Switch Replacement

1. Remove the steering wheel and the steering column covers.
2. Disconnect the 7-P and 4-P connectors.
3. Remove the two screws and slide the combination light switch out of the housing as shown.

NOTE: Be careful not to damage the steering wheel cover.

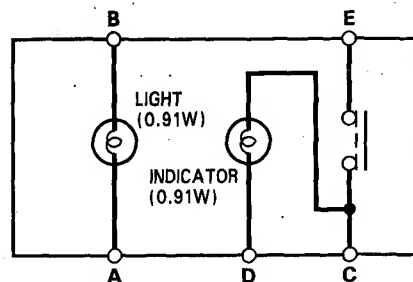
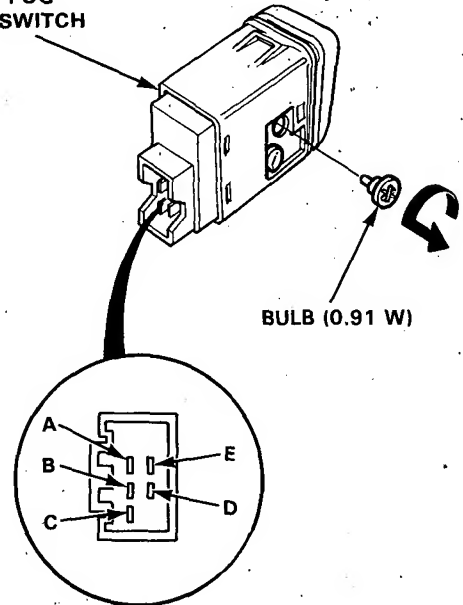


## Front Fog Light Switch Test

1. Remove the instrument panel (see page 23-116).
2. Remove the fog light switch.
3. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	A		B	C		D	E
OFF	○	⊕	○		○	⊕	○
ON	○	⊕	○	○	⊕	○	○

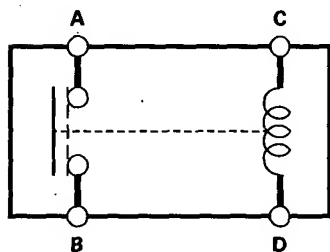
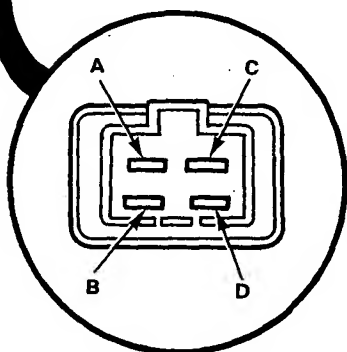
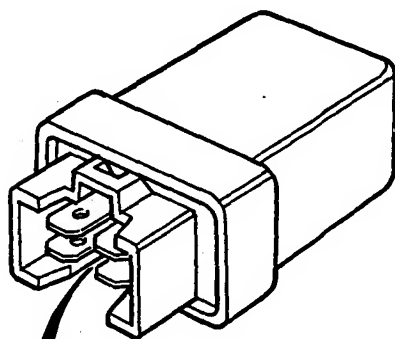
FRONT FOG LIGHT SWITCH





## Front Fog Light Relay Test

1. Remove the relay and disconnect it from the harness.
2. There should be continuity between the C and D terminals.
3. There should be continuity between the A and B terminals when battery power and ground are connected to the C and D terminals. There should be no continuity when power is disconnected.



## Daytime Running Lights Resistor Test (Canada)

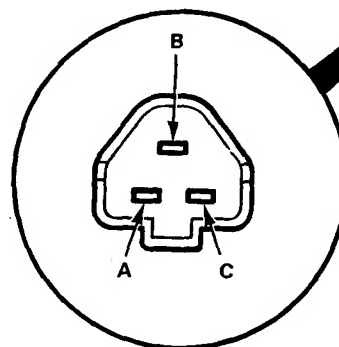
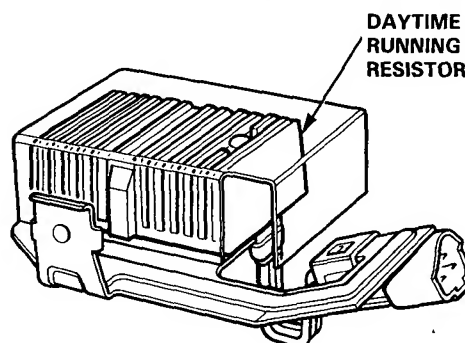
**CAUTION:** The daytime running lights resistor becomes very hot when the daytime running lights are on; do not touch it or the attaching hardware immediately after the lights have been turned off.

1. Disconnect the 3-P connector from the resistor.
2. Using an ohmmeter, measure the resistance between the terminals.

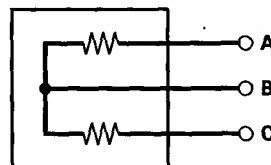
**Headlight Resistance:**  $1.0 \pm 0.05 \Omega$

Between the B and C terminals = Left headlight

Between the B and A terminals = Right headlight



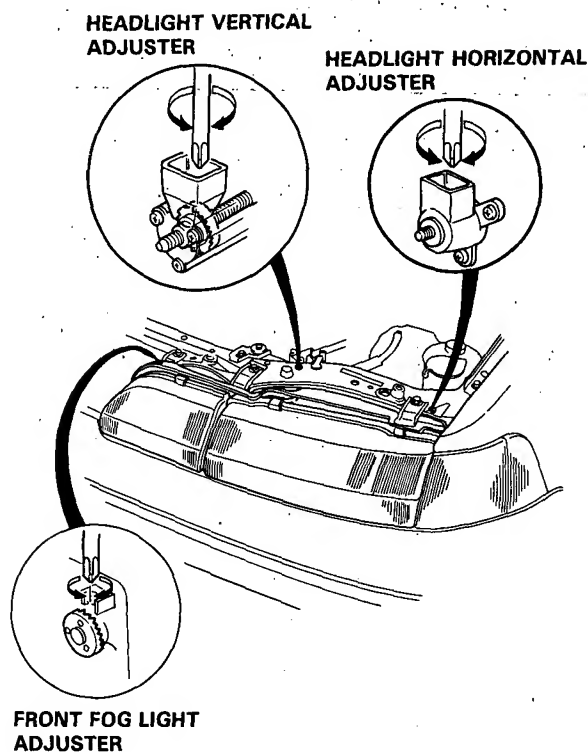
View from terminal side



3. Replace the resistor if the resistance is not within specifications.

# Headlights/Front Fog Lights

## Adjustment



NOTE: Adjust the headlights and front fog lights to local requirements.

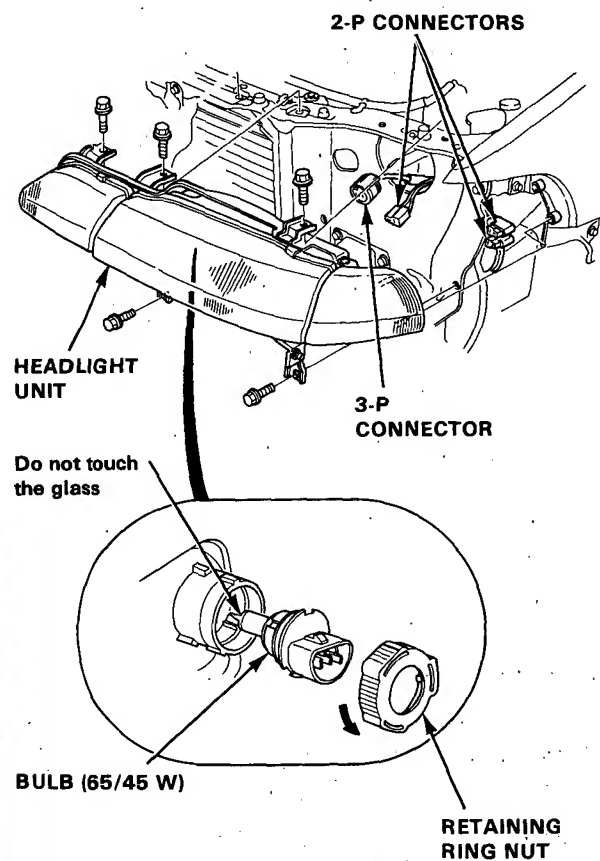
## Headlights Replacement

### CAUTION:

- Halogen headlights can become very-hot in-use; do not touch them or the attaching hardware immediately after they have been turned off.

- Do not try to replace or clean the headlights with the lights on.

1. Disconnect the 3-P connector and 2-P connectors from each bulb. Before disconnecting the right side connectors, remove the air cleaner case.
2. Turn the retaining ring nut to the OPEN position, then remove the bulb.
3. Remove the front bumper, air intake tube, and five mounting bolts, then remove the unit.



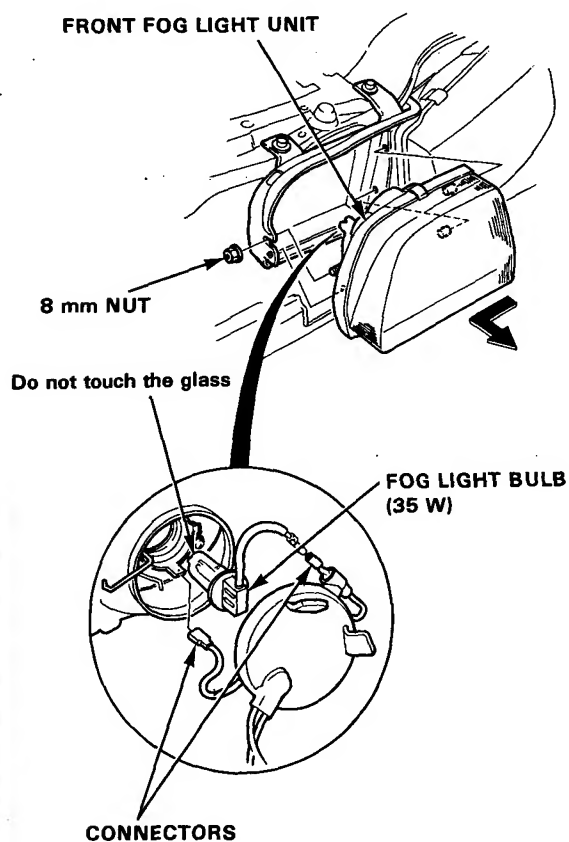
4. After installing the unit, adjust the headlights to local requirements.

## Front Fog Lights Replacement

### CAUTION:

- Halogen bulbs can become very hot in use; do not touch them or the attaching hardware immediately after they have been turned off.
- Do not try to replace or clean the headlights with the lights on.

1. Remove the 8 mm nut and pull out the front fog light unit from the headlight unit.
2. Disconnect the connectors and remove the bulb.



3. After installing the unit, adjust the front fog lights to local requirements.

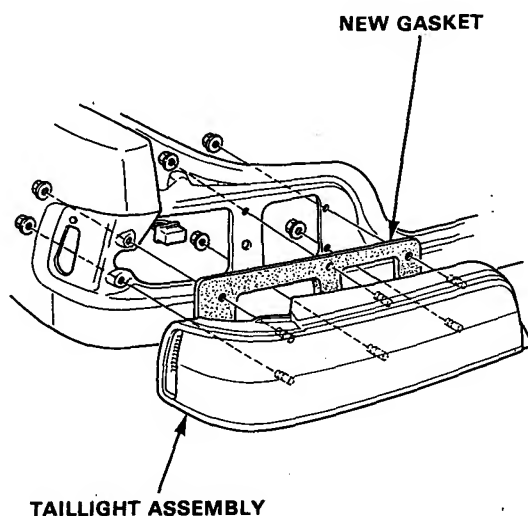
**NOTE:** If the bumper seal interferes with the front fog light when installing the light, push the bumper downward to maintain the bumper seal.

## Taillight Assembly



## Replacement

1. Open the trunk lid or hatch and tailgate, then remove the access panel.
2. Disconnect the 6-P connector from behind the taillight.
3. Remove the six mounting nuts and the taillight assembly.

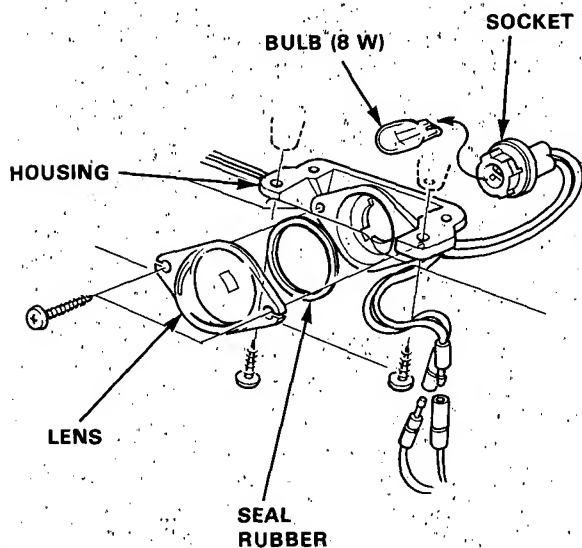


4. Inspect the gasket; replace it if it is distorted or overly compressed.
5. After installing, make sure that there is no water leakage in the taillight assembly.

## License Plate Lights

### Replacement

1. Remove the two screws and disconnect the connectors, then separate the lens from the housing by removing its two mounting screws.

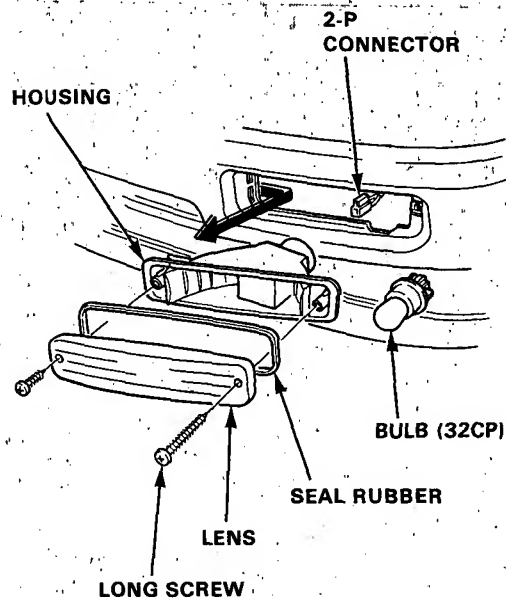


2. Turn the bulb socket 45° counterclockwise to remove it from the housing.

## Front Turn Signal Lights

### Replacement

1. Remove the two screws and the front turn signal lights, then disconnect the 2-P connector.



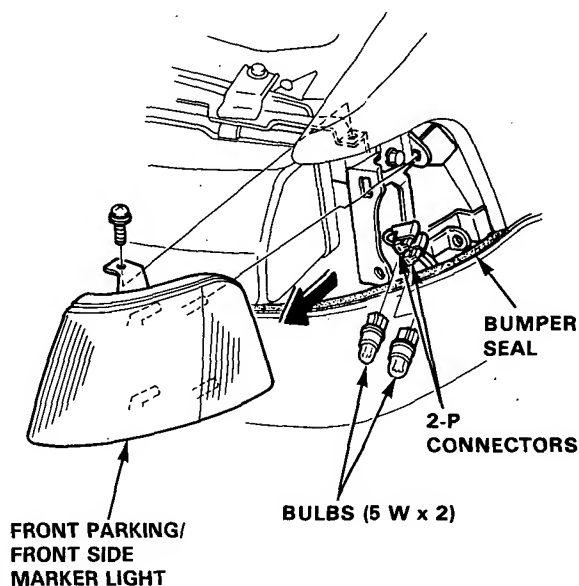
2. Turn the bulb socket 45° counterclockwise to remove it from the housing.



# Front Parking/ Front Side Marker Light

## Replacement

1. Remove the screw and pull out the front side marker light from the bracket, then disconnect the 2-P connectors.



2. Turn the bulb socket 45° counterclockwise to remove it from the front side marker light.

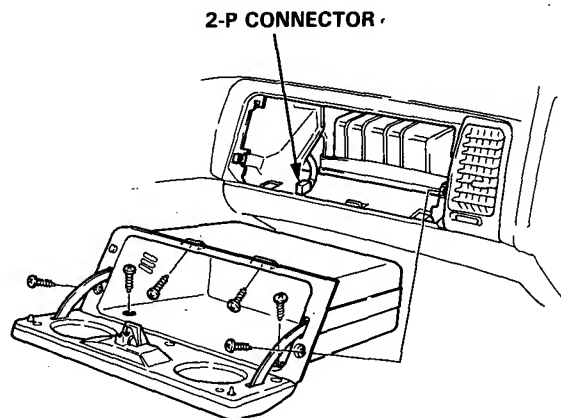
**NOTE:** If the bumper seal interferes with the front side marker light when installing the light, push the bumper downward to maintain the bumper seal.

# Glove Box Light

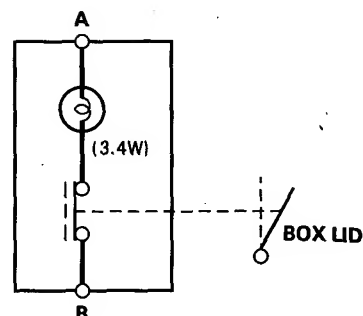
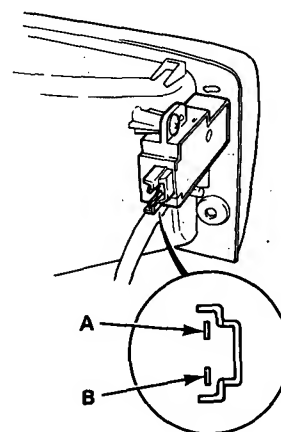


## Test

1. Remove the six screws and pull out the glove box, then disconnect the 2-P connector.



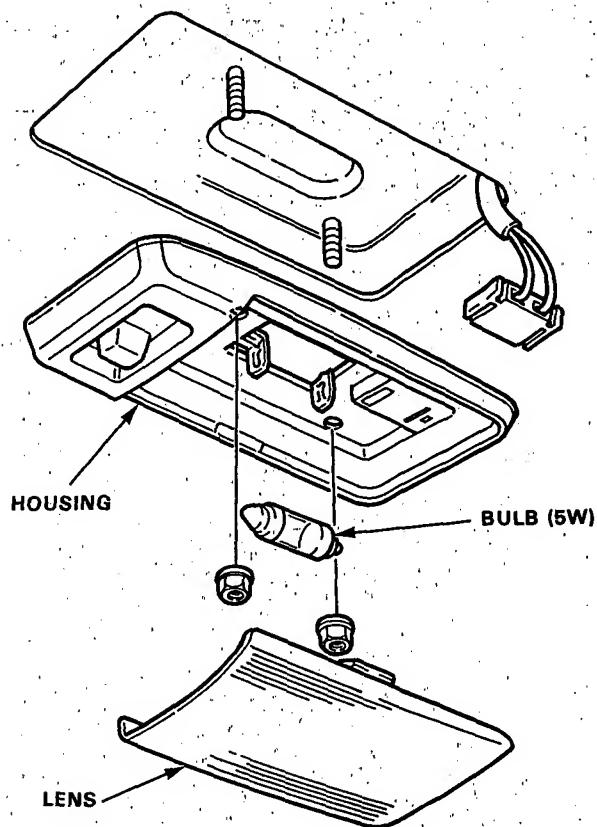
2. There should be continuity between the A and B terminals when the glove box lid is open. There should be no continuity when the glove box lid is closed.



# Ceiling Light

## Test

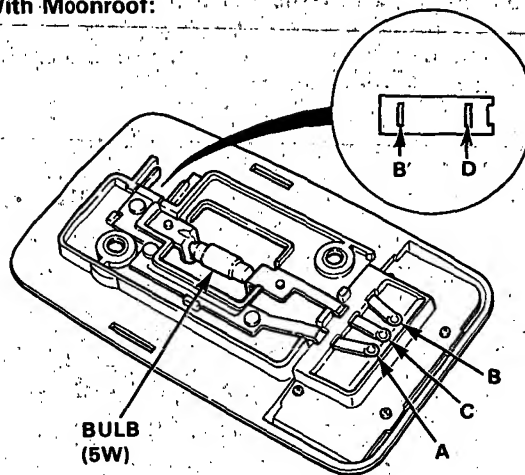
1. Turn the light switch OFF.
2. Pry off the lens.
3. Remove the two nuts and the housing.
4. Disconnect the 2-P connector from the housing.



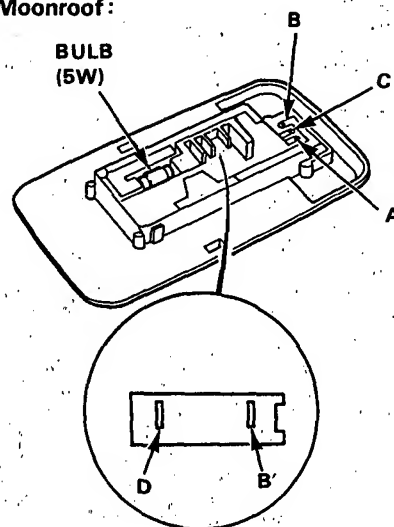
5. Remove the ceiling light.
6. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	A	B or B'	C		D
OFF			○	○	○
MIDDLE		○	○	○	○
ON	○		○	○	○

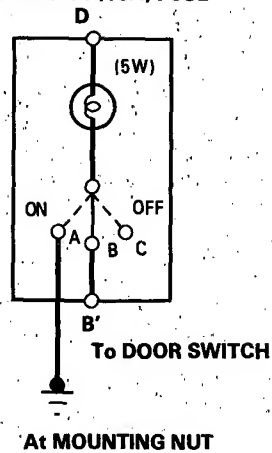
### With Moonroof:



### Without Moonroof:



### From No. 14 (15A) FUSE



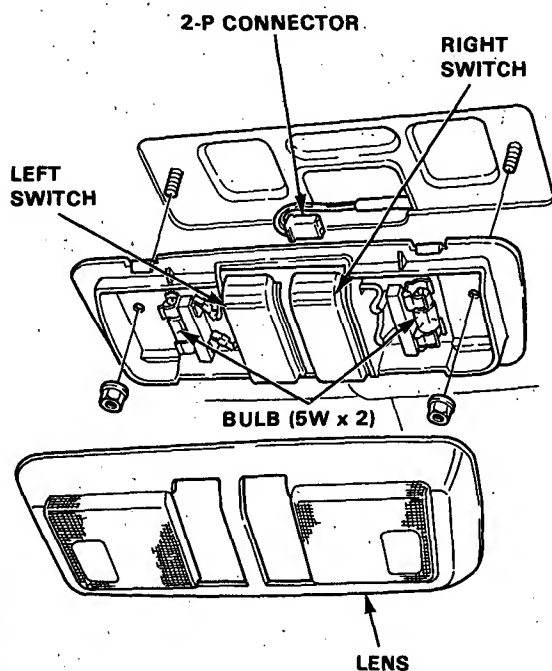
At MOUNTING NUT

# Front Map Light



## Test

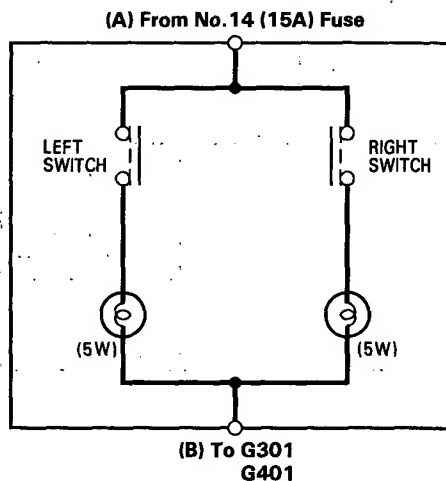
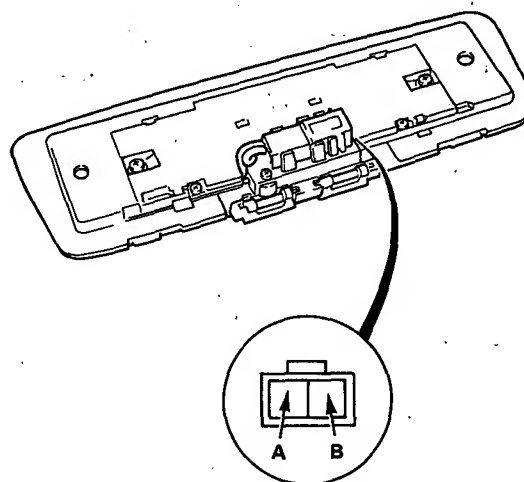
1. Turn the map light switch OFF and pry off the lens.
2. Remove the two nuts and the map light, then disconnect the 2-P connector.



3. Check for continuity between the terminals in each switch position according to the table.

Terminal		A		B
Position				
RIGHT SWITCH	ON	○	⊕	○
	OFF			
LEFT SWITCH	ON	○	⊕	○
	OFF			

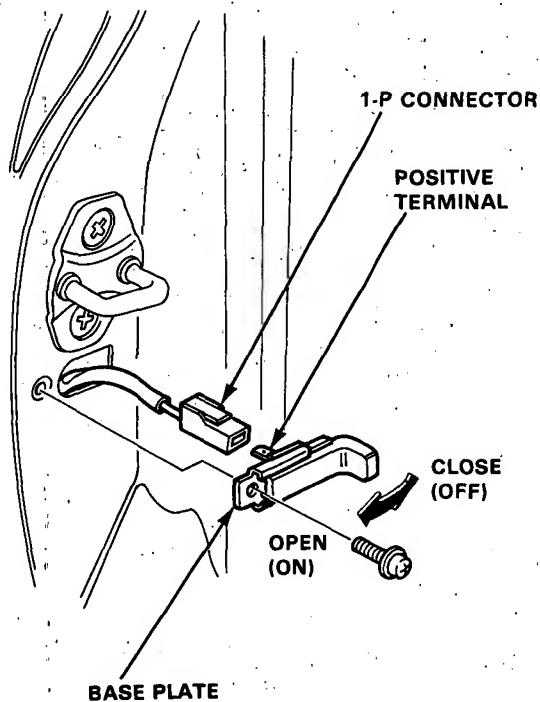
NOTE: Set either switch OFF when testing the other switch.



## Door Switches

### Test

1. Open the door.
2. Remove the screw and pull out the door switch.
3. Disconnect the 1-P connector from the switch.

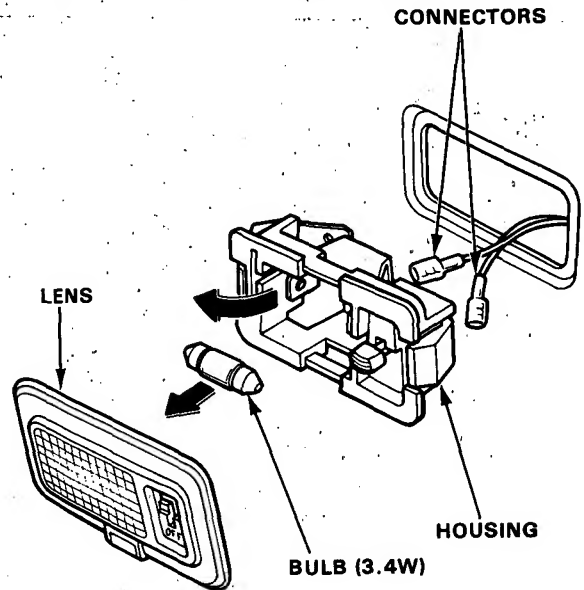


4. There should be continuity between the positive terminal and base plate (ground) with the switch released (door opened). There should be no continuity with the switch pushed (door closed).

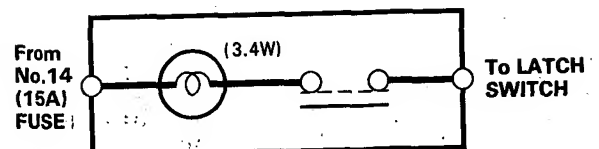
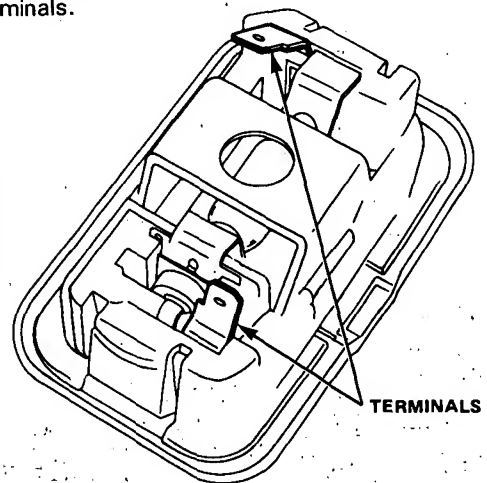
## Trunk/Cargo Area Light

### Test

1. Pry the trunk/cargo area light lens out of its housing.
2. Pry out the light assembly.
3. Disconnect the connectors from the housing.



4. Make sure that the bulb is in good condition. Set the trunk/cargo area light switch in the ON position and check for continuity between the terminals.



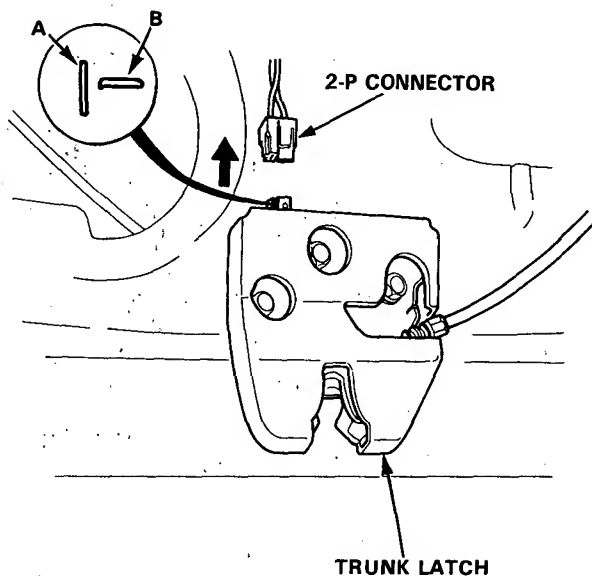
# Latch Switch



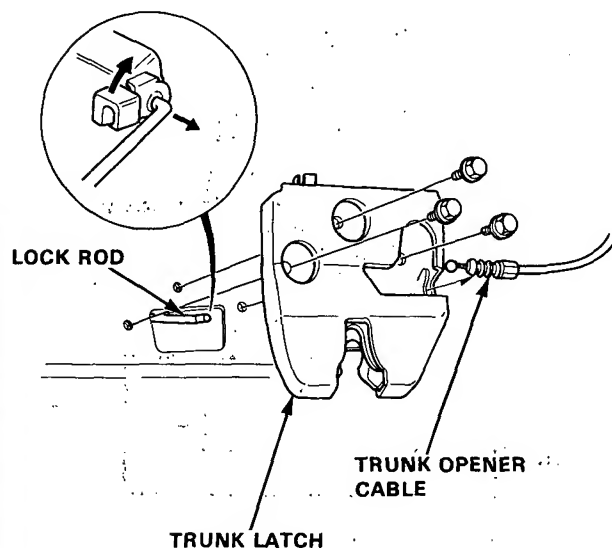
## Test/Replacement

### Sedan:

1. Open the trunk lid and disconnect the 2-P connector from the trunk latch.
2. There should be continuity between the A and B terminals.

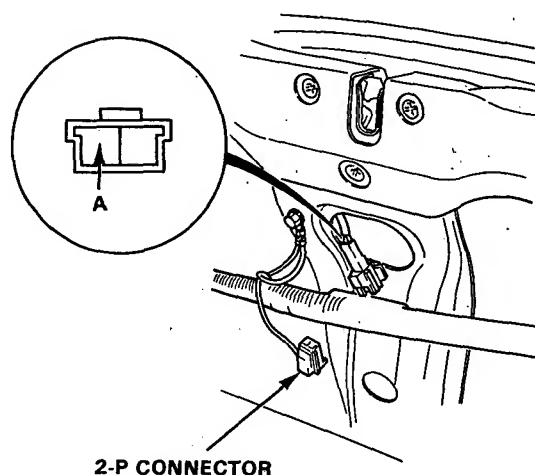


3. If necessary, remove the three bolts to pull out the latch from the trunk lid, then disconnect the lock rod from the latch.
4. Disconnect the trunk opener cable from the latch.

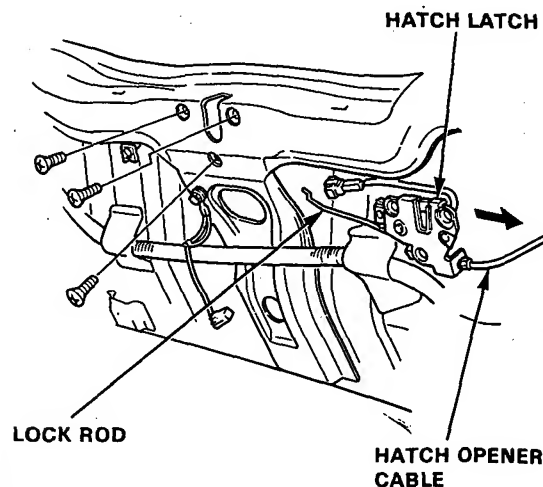


### Hatchback:

1. Open the hatch and disconnect the 2-P connector from the hatch latch.
2. There should be continuity between the A terminal and body ground.

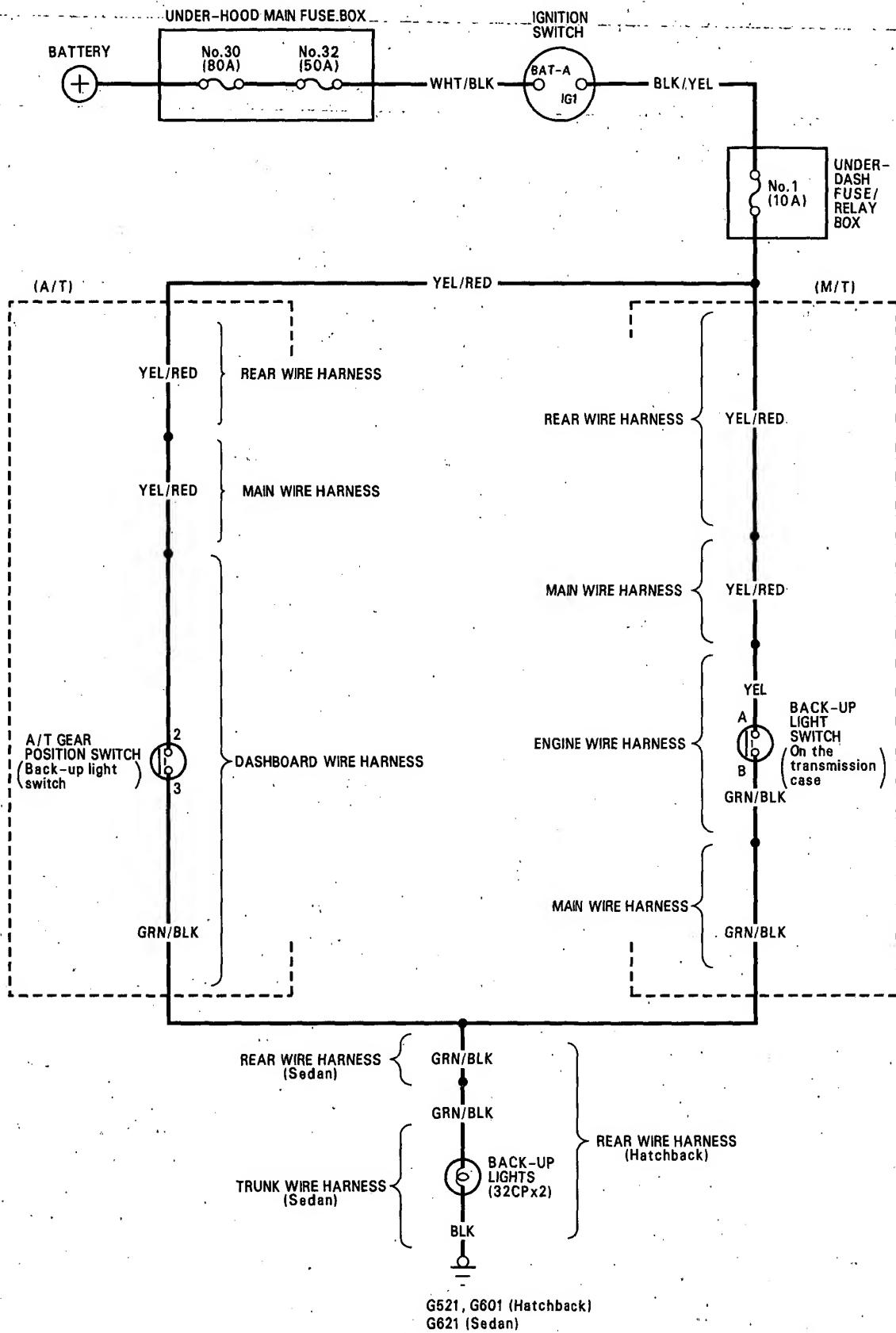


3. If necessary, remove the three bolts to pull out the latch from the trunk, then disconnect the lock rod from the latch.
4. Disconnect the hatch opener cable from the latch.



# Back – up Lights

## Circuit Diagram

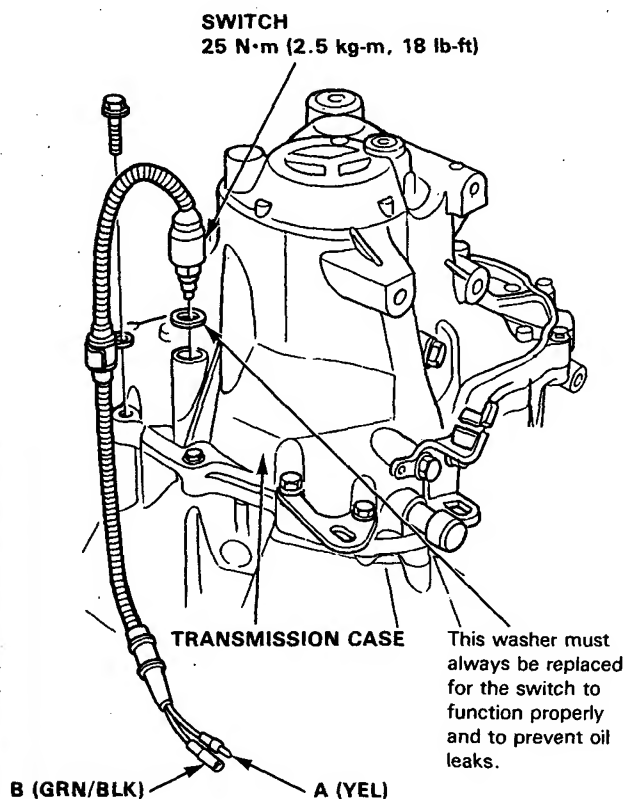




## Switch Test

### Manual Transmission:

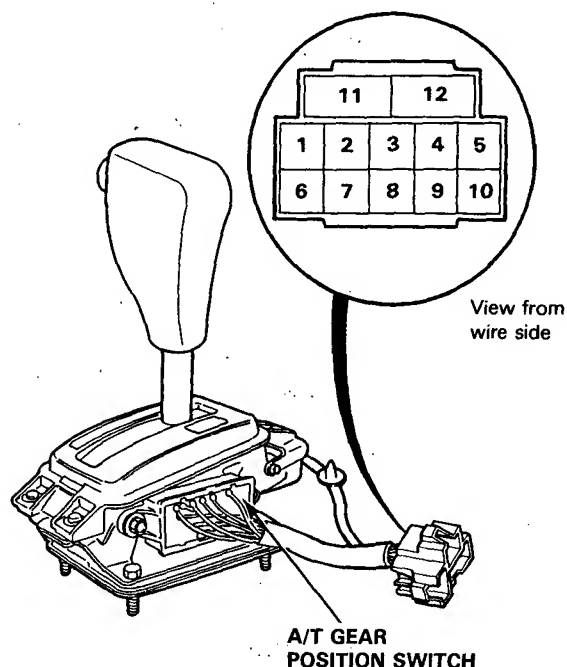
1. Turn the ignition switch on and move the shift lever to **R** position. The back-up lights should come on.
  - If one back-up light does not go on, check for a blown bulb in the taillight assembly.
  - If both back-up lights do not go on, check for a blown No. 1 (10 A) fuse in the under-dash fuse/relay box.
  - If the fuse and bulbs are OK, go to step 2.
2. Disconnect the connectors from the back-up light switch.



3. With the shift lever in **R**, check for continuity between the A and B terminals. There should be continuity.
  - If there is no continuity, replace the switch (see section 13).
  - If there is continuity, but the back-up lights do not go on, check for:
    - An open in the YEL or GRN/BLK wire.
    - Poor ground. (Hatchback: G521, G601)  
(Sedan : G621)

### Automatic Transmission:

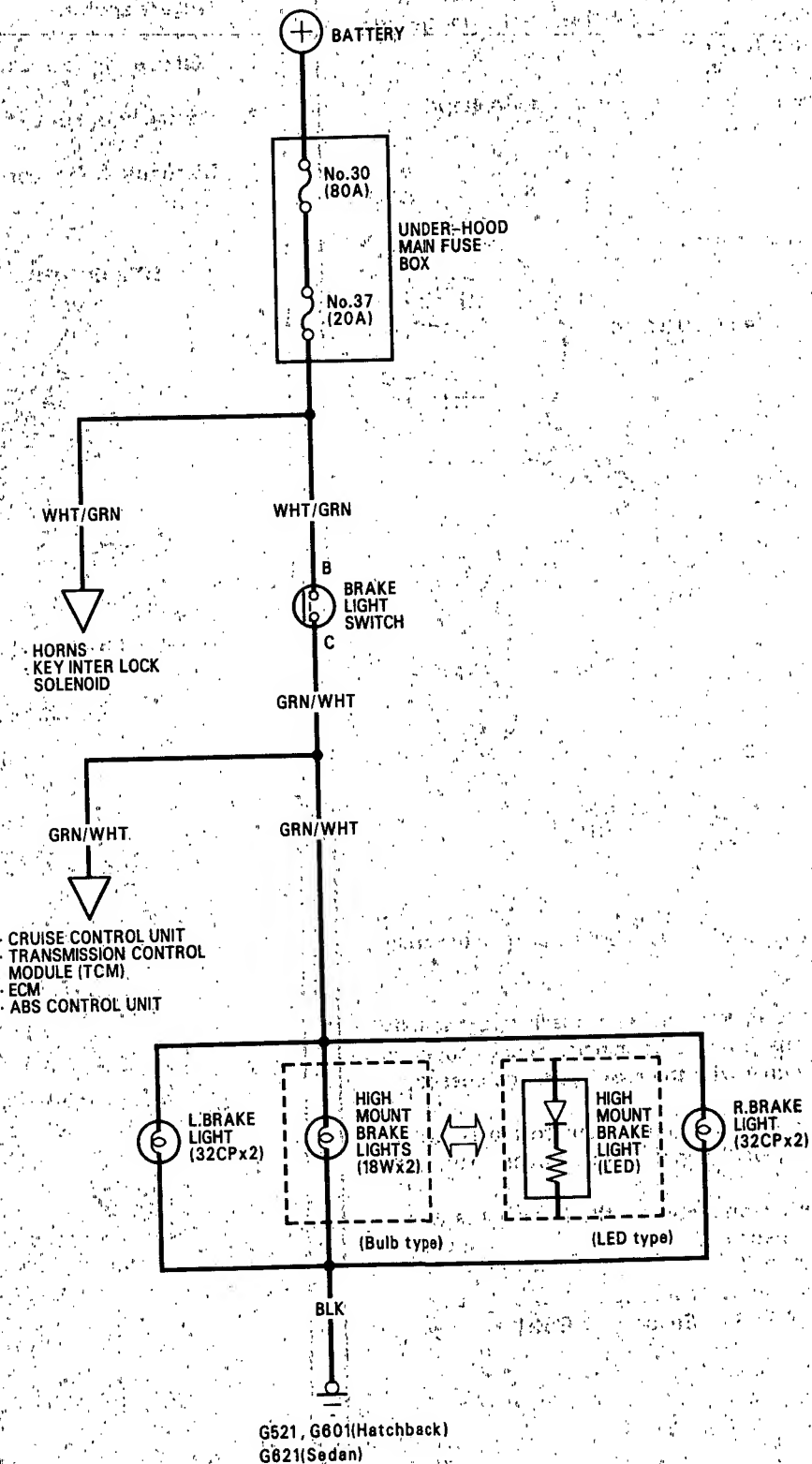
1. Turn the ignition switch on and move the shift lever to **R**. The back-up lights should come on.
  - If one back-up light does not go on, check for a blown bulb in the taillight assembly.
  - If both back-up lights do not go on, check for a blown No. 1 (10 A) fuse in the under-dash fuse/relay box.
  - If the fuse and bulbs are OK, go to step 2.
2. Disconnect the 10-P connector from the A/T gear position switch (back-up light switch).



3. Move the shift lever back and forth in **R** position without touching the push button and check for continuity between No. 2 and No. 3 terminals. There should be continuity within the range of free play of the shift lever.
  - If there is no continuity within the range of free play, adjust the position of the A/T gear position switch (see page 23-131).
  - If there is continuity, but the back-up lights do not go on, check for:
    - An open in the YEL or GRN/BLK wire.
    - Poor ground. (Hatchback: G521, G601)  
(Sedan : G621)

# Brake/High Mount Brake Lights

## Circuit Diagram



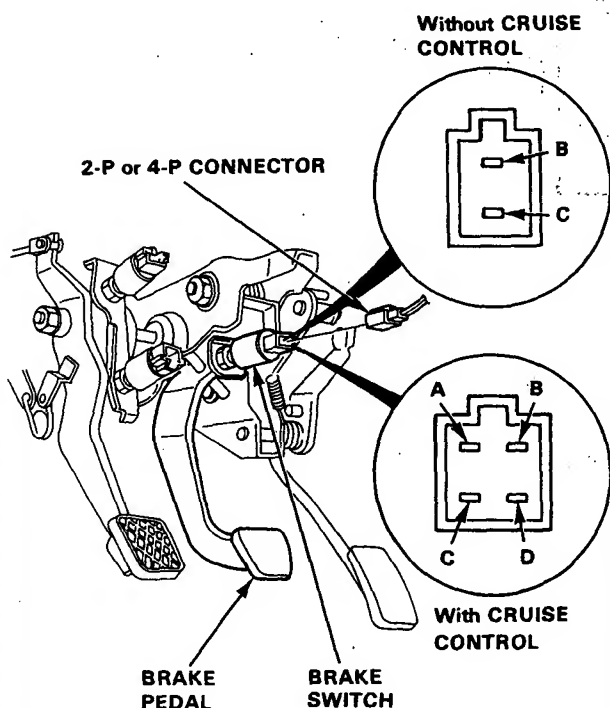


# Brake/High Mount Brake Lights



## Brake Switch Test

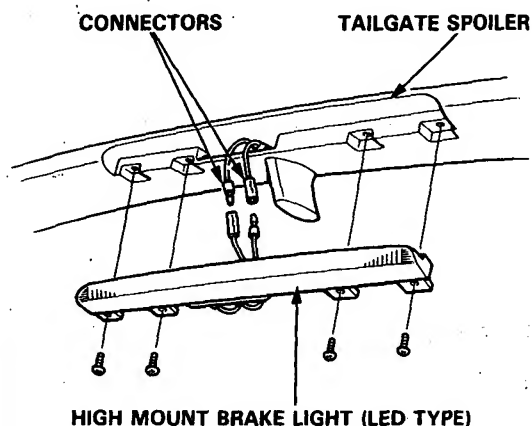
1. Check the brake lights with the brake pedal depressed.
  - If one or both lights do not go on, check for:
    - Blown No. 37 (20 A) fuse in the under-hood main fuse box.
    - Blown bulb.
  - If the fuse and bulbs are OK, go to step 2.



2. Disconnect the 2-P or 4-P connector from the brake switch.
3. Depress the brake pedal and check for continuity between the B and C terminals. There should be continuity only with the brake pedal depressed.
  - If there is no continuity, replace the switch or adjust pedal height (see section 19), and recheck.
  - If there is continuity, but the brake lights do not go on, check for:
    - An open in the WHT/GRN or GRN/WHT wire.
    - Poor ground. (Hatchback: G521, G601)  
(Sedan : G621)

## High Mount Brake Light Replacement (LED type)

1. Carefully remove the high mount brake light without damaging the tailgate trim panel and tailgate spoiler.
2. Remove the four screws from the light.
3. Pry the light out of the tailgate spoiler.
4. Disconnect the connectors from the light, and replace it.

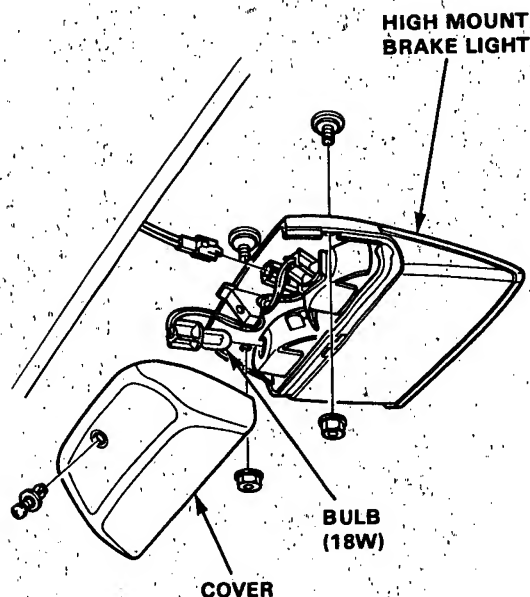


# High Mount Brake Light

## Replacement (Bulb type)

### Hatchback:

1. Open the hatch.
2. Remove the screw and the cover.
3. Remove the two nuts and the high mount brake light, then disconnect the 2-P connector.

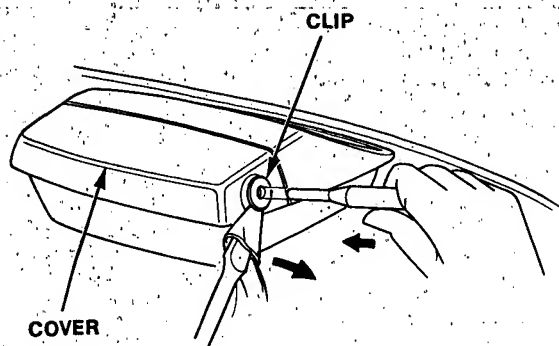


4. Turn the socket 45° counterclockwise to remove the bulb.
5. Install the high mount brake light in the reverse order of removal, and clean the rear window glass before installing.

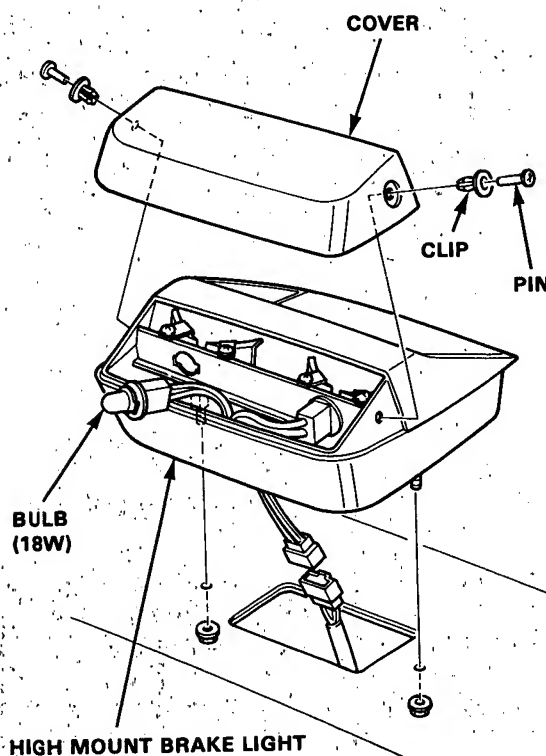
**CAUTION:** When installing the high mount brake light, make sure the mount rubber is sealed evenly to the rear window glass.

### Sedan:

1. Open the trunk lid.
2. Push the pin into the cover, then remove the clip.



3. Remove the two nuts and the high mount brake light, then disconnect the 2-P connector.



4. Turn the socket 45° counterclockwise to remove the bulb.
5. Install the high mount brake light in the reverse order of removal.

### NOTE:

- Clean the rear window glass before installing.
- When attaching the clip to the cover, put the pin into the clip first, then push it into the cover.

# Side Marker/Turn Signal/Hazard Flasher System



## Component Location Index

### COMBINATION LIGHT/TURN SIGNAL SWITCH

Test, page 23-147

Replacement, page 23-148

### TURN SIGNAL INDICATOR LIGHTS

(In the gauge assembly)

Gauge Assembly, page 23-110

### HAZARD WARNING SWITCH

Removal, page 23-111

Test, page 23-167

### TURN SIGNAL/HAZARD RELAY

Input Test, page 23-166

### SIDE MARKER FLASHER CIRCUIT

(Built into the integrated control unit)

Input Test, page 23-134

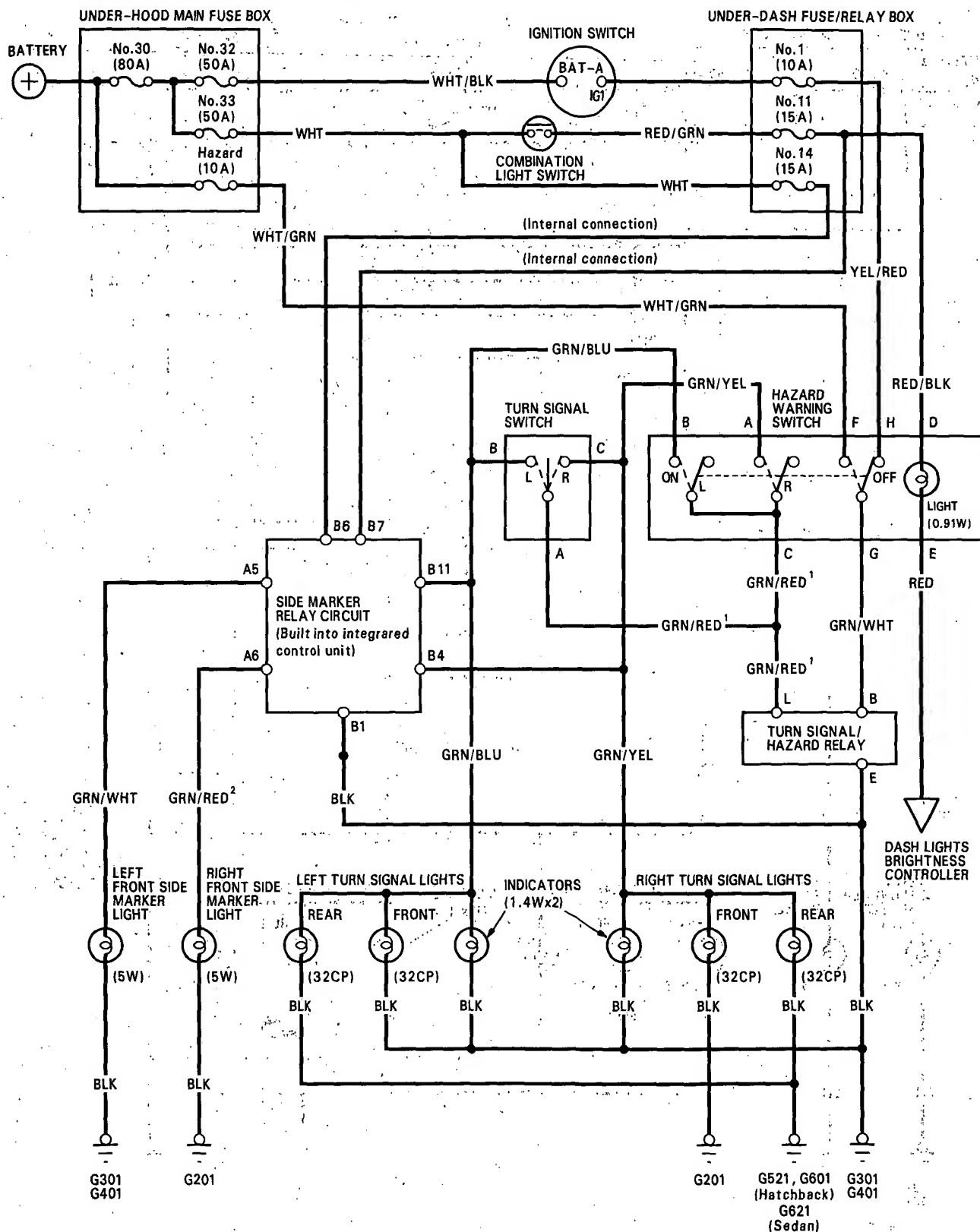
### UNDER-DASH FUSE/RELAY BOX

(View from rear side)

# Side Marker/Turn Signal/Hazard Flasher System

## Circuit Diagram (USA)

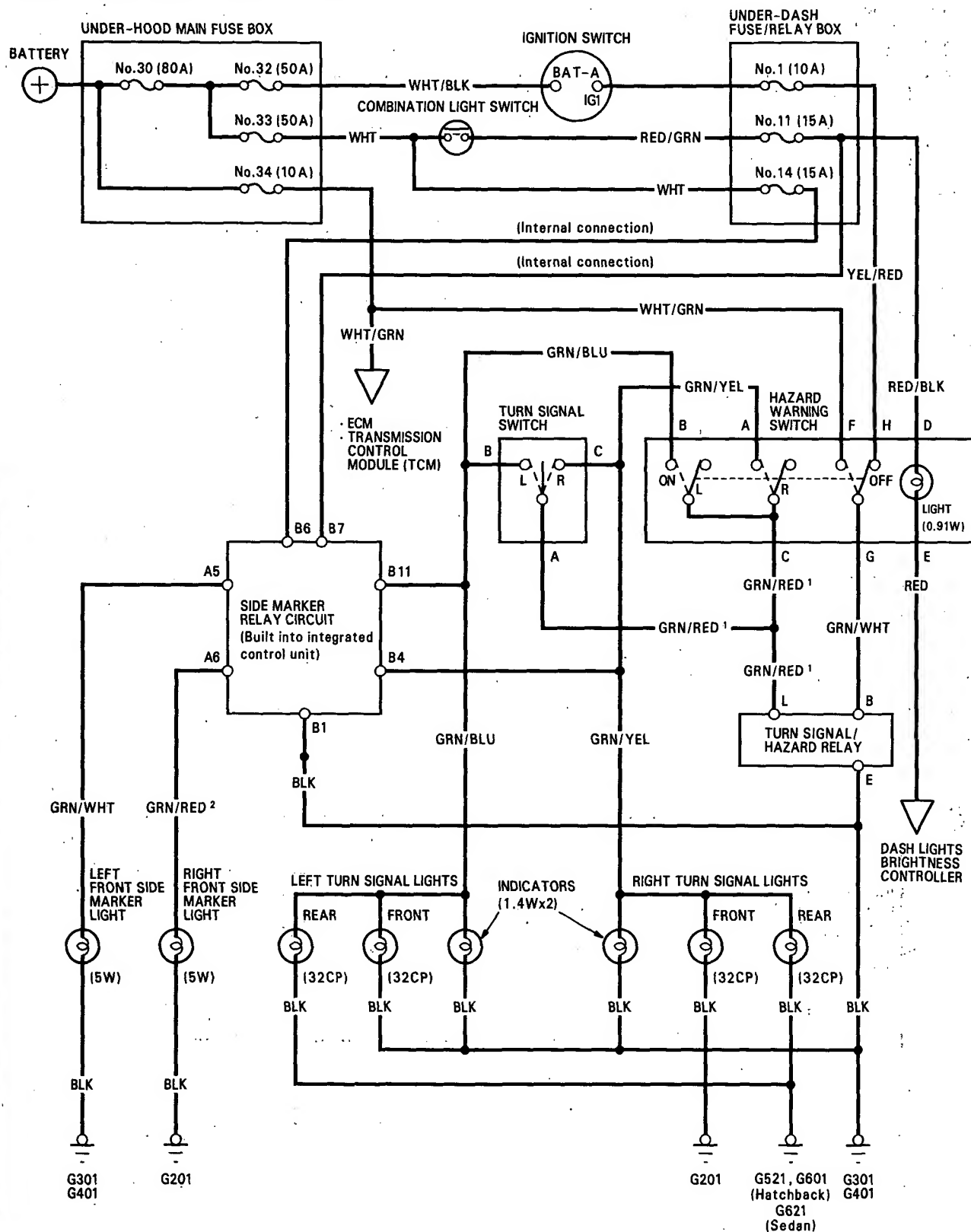
NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, GRN/RED<sup>1</sup> and GRN/RED<sup>2</sup> are not the same).





## Circuit Diagram (Canada)

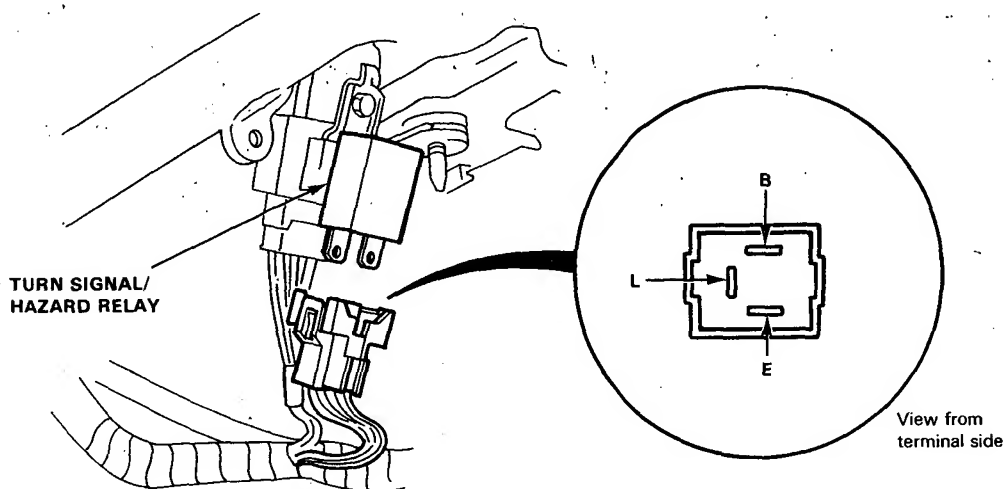
NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, GRN/RED<sup>1</sup> and GRN/RED<sup>2</sup> are not the same).



# Side Marker/Turn Signal/Hazard Flasher System

## Turn Signal/Hazard Relay Input Test

1. Remove the driver's side kick-panel, then disconnect the 3-P. connector from the turn signal/hazard relay.
2. Inspect the connector and socket terminals to be sure they are all making good contact.
  - If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
  - If the terminals look OK, make the following input tests at the connector.
    - If any test indicates a problem, find and correct the cause, then recheck the system.
    - If all input tests prove OK, the turn signal/hazard relay must be faulty; replace it.



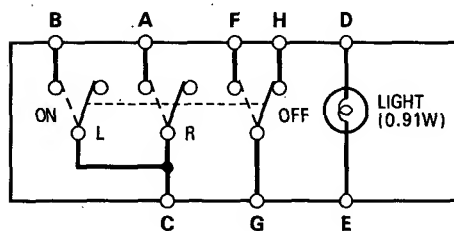
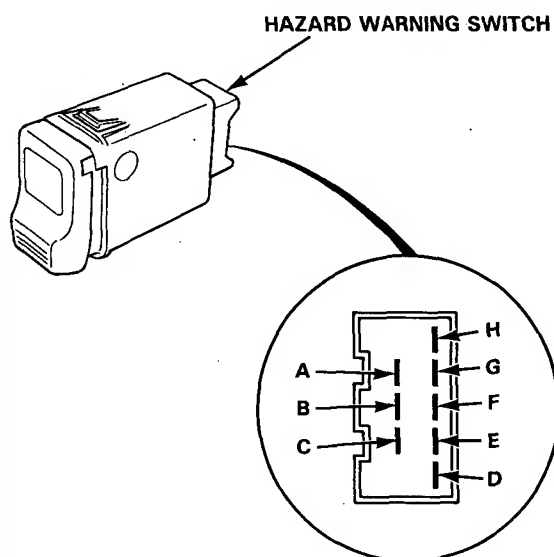
No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	E	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401)</li> <li>• An open in the BLK wire.</li> </ul>
2	B	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 1 (7.5A) fuse. (in the under-dash fuse/relay box)</li> <li>• An open in the YEL/RED or GRN/WHT wire.</li> <li>• Faulty hazard warning switch.</li> </ul>
3	B and L	Turn the hazard warning switch ON and connect the B terminal to the L terminal.	Hazard warning lights should come on.	<ul style="list-style-type: none"> <li>• Blown HAZARD (10A) fuse (USA).</li> <li>• Blown No. 34 (10A) fuse (in the under-hood main fuse box) (Canada).</li> <li>• Blown bulb.</li> <li>• Poor ground (G201, G301, G401 and: G521, G601 (Hatchback) G621 (Sedan)).</li> <li>• Faulty hazard warning switch.</li> <li>• Faulty side marker relay circuit.</li> <li>• An open in the WHT/GRN, GRN/ RED<sup>1</sup>, GRN/YEL or GRN/BLU wire.</li> </ul>
		Turn the ignition switch ON and the turn signal switch to Right or Left, and connect the B terminal to the L terminal.	Right or left side turn lights should come on.	<ul style="list-style-type: none"> <li>• Faulty turn signal switch.</li> </ul>



## Hazard Warning Switch Test

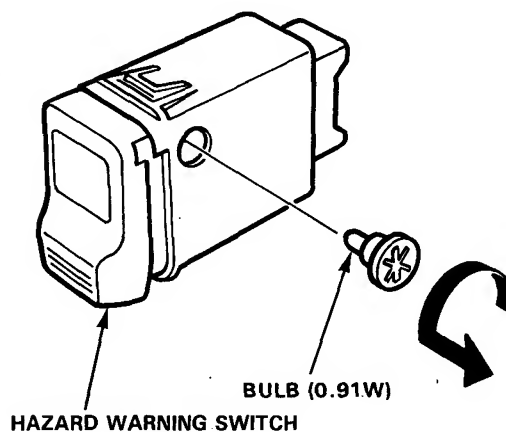
1. Remove the instrument panel (see page 23-115).
2. Remove the hazard warning switch from the instrument panel.
3. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	A	B	C	D	E	F	G	H
OFF				○	○		○	○
ON	○	○	○	○	○	○		



## Bulb Replacement

1. Remove the instrument panel (see page 23-115).
2. Remove the hazard warning switch from the instrument panel.
3. Turn the socket 45° counterclockwise to remove the bulb.

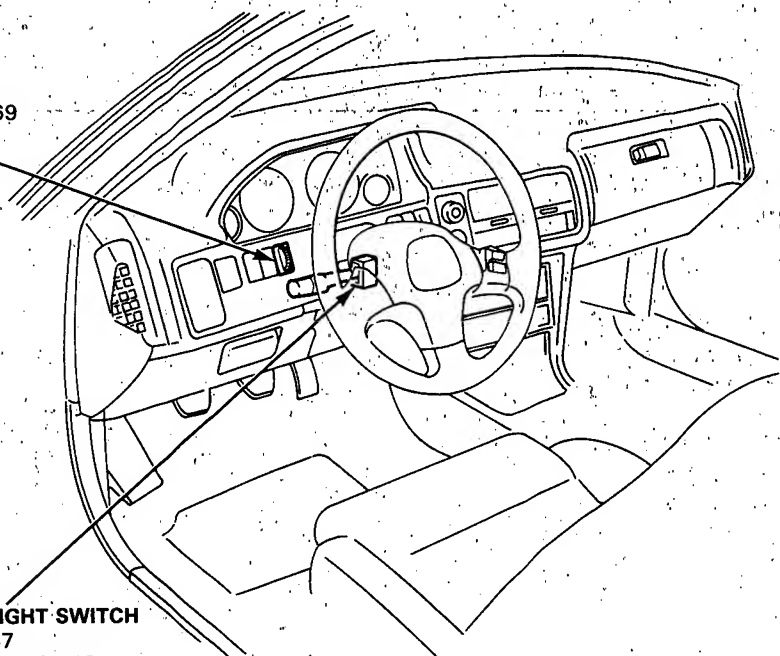


# Dash Lights Brightness Control

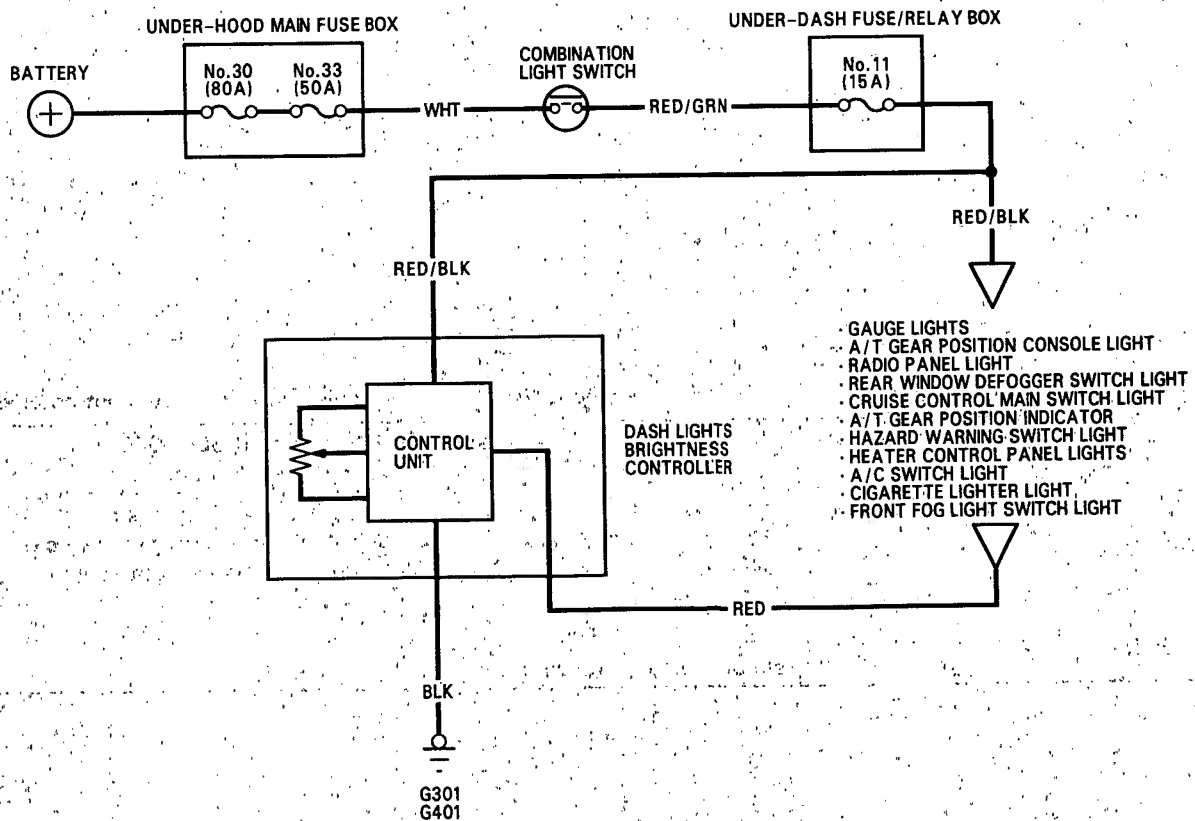
## Component Location Index

**DASH LIGHTS  
BRIGHTNESS  
CONTROLLER**  
Removal, page 23-115  
Input Test, page 23-169

**COMBINATION LIGHT SWITCH**  
Test, page 23-147  
Replacement, page 23-148



## Circuit Diagram





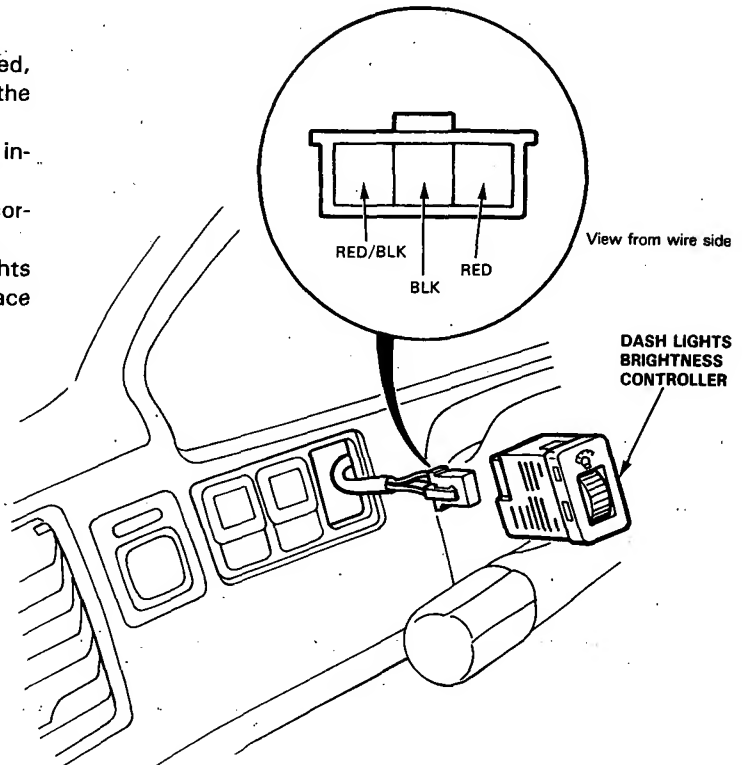
# Dash Lights Brightness Controller



## Controller Input Test

**NOTE:** The control unit is built into the dash lights brightness controller.

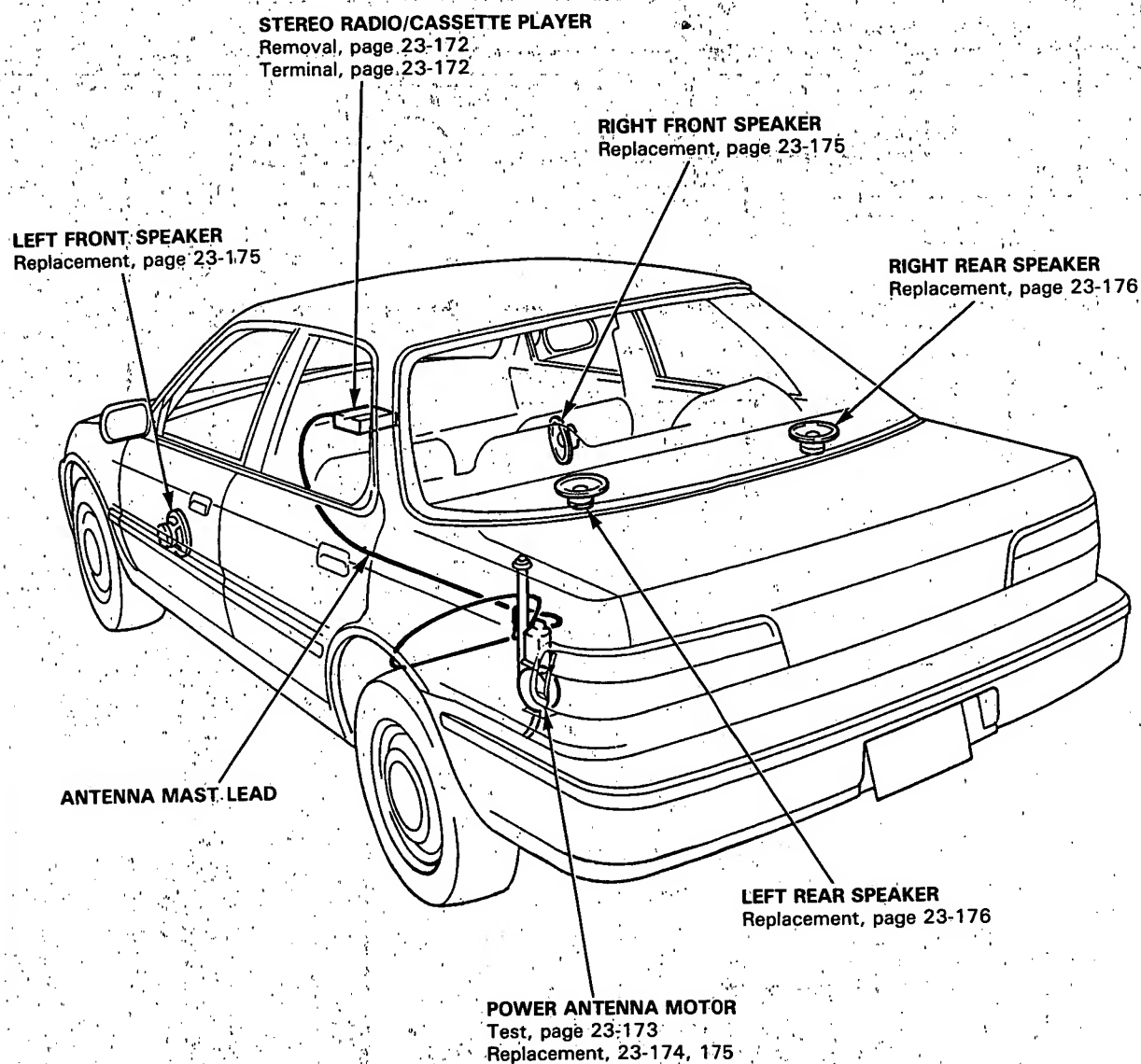
1. Remove the dashboard lower cover, then push out the dash lights brightness controller from behind the instrument panel.
2. Disconnect the 3-P connector from the dash lights brightness controller.
3. Inspect the connector terminals to be sure they are all making good contact.
  - If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
  - If the terminals look OK, make the following input tests at the connector.
    - If any test indicates a problem, find and correct the cause, then recheck the system.
    - If all input tests prove OK, the dash lights brightness controller must be faulty; replace it.



No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
2	RED/BLK	Headlight switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 11 (15A) fuse. (in the under-dash fuse/relay box)</li> <li>• Faulty combination light switch.</li> <li>• An open in the wire.</li> </ul>
3	RED	Headlight switch ON.	Attach to ground: Dash lights should come on full bright.	<ul style="list-style-type: none"> <li>• An open in the wire.</li> </ul>

# Stereo Sound System

## Component Location Index

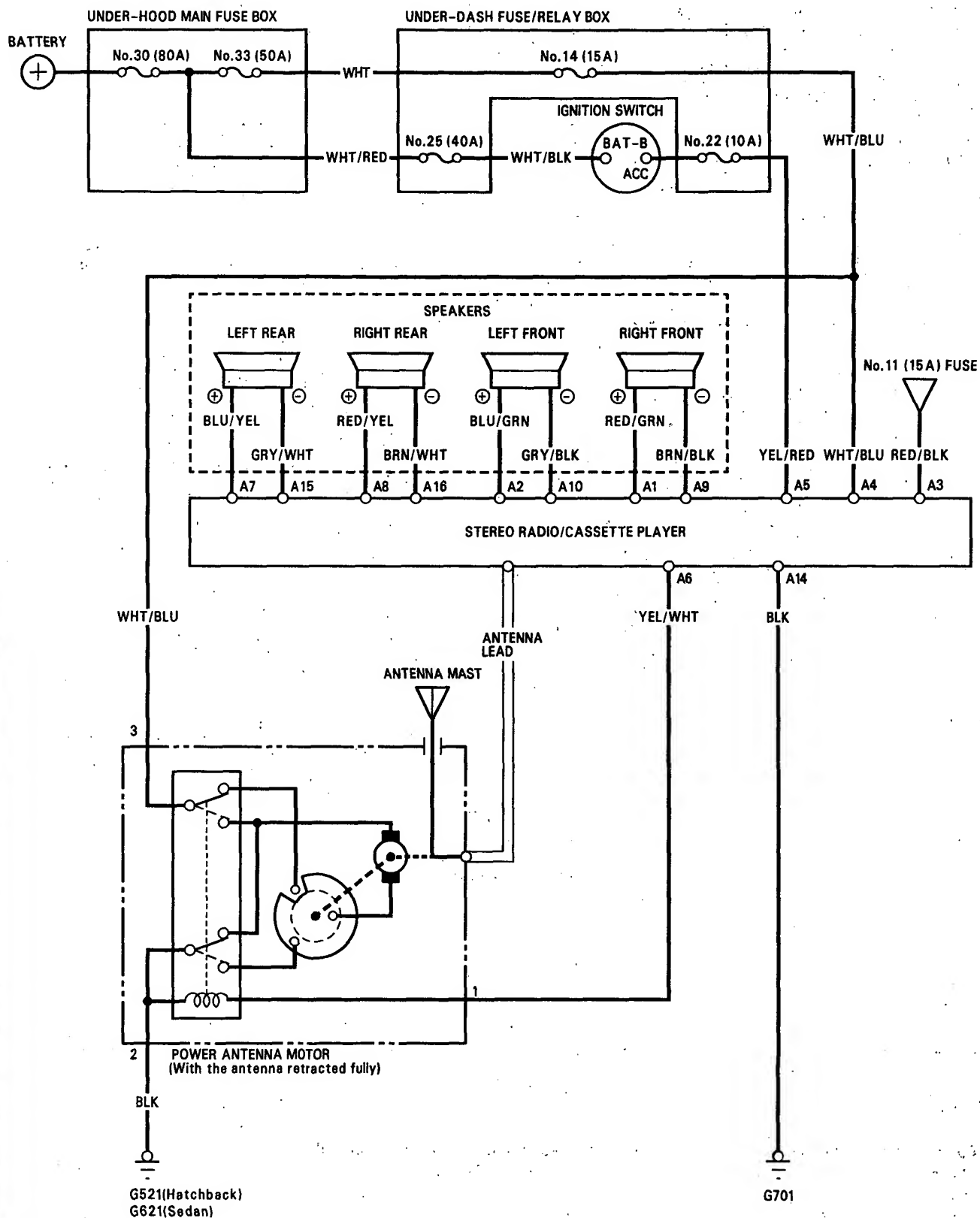


## Description

For the stereo radio/cassette player description, please see the owner's manual. The power antenna mast is controlled entirely by the radio ON/OFF switch. It will extend fully any time the radio and the ignition switches are on. When the radio or the ignition is shut off, it retracts fully. The power antenna motor has a built-in relay together with a limit switch for this function.



## Circuit Diagram



# Stereo Sound System

## Unit Removal

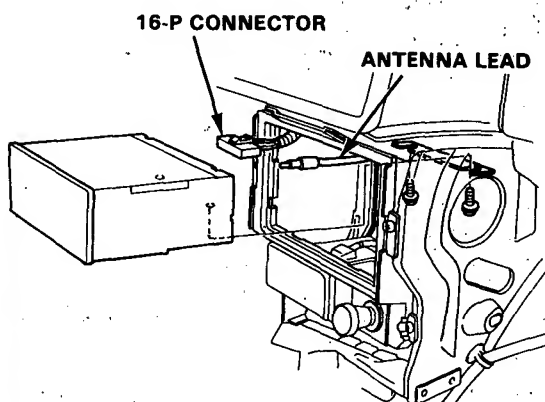
### NOTE:

The radio may have a coded theft protection circuit. Be sure to get the customer's code number before

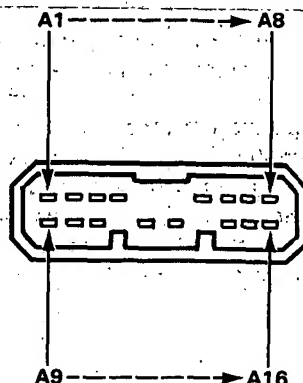
- Disconnecting the battery.
- Removing the No. 14 (15A) fuse.  
(in the under-dash fuse/relay box)
- Removing the radio.

After service, reconnect power to the radio and turn it on. When the word "CODE" is displayed, enter the customer's 5-digit code to restore radio operation.

1. Remove the front console.
2. Remove the two screws, then pull the stereo radio/cassette player out of the center instrument panel.
3. Disconnect the 16-P connector and the antenna lead.



## Radio/Cassette Unit Terminals



### Terminal (Wire color)

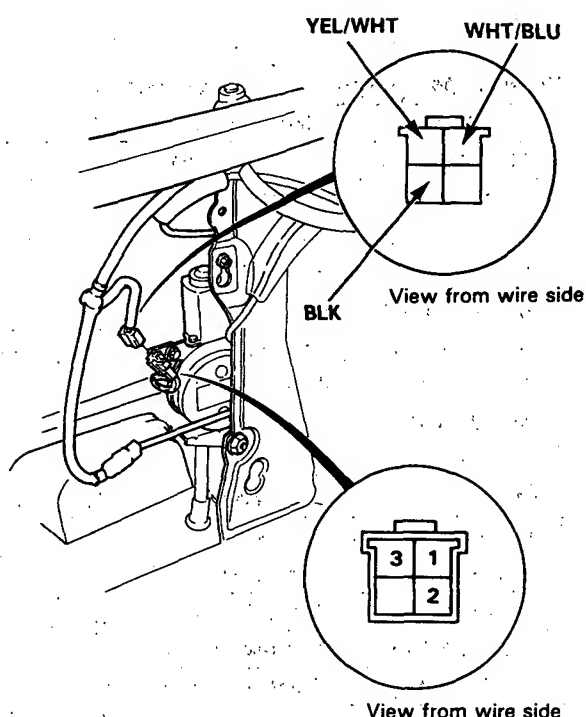
### Connects to

A1 (RED/GRN)	Right front speaker ⊕
A2 (BLU/GRN)	Left front speaker ⊕
A3 (RED/BLK)	Lights-on signal
A4 (WHT/BLU)	Constant power (Tuning memory)
A5 (YEL/RED)	ACC (Main stereo power supply)
A6 (YEL/WHT)	Power to antenna with radio switch ON
A7 (BLU/YEL)	Left rear speaker ⊕
A8 (RED/YEL)	Right rear speaker ⊕
A9 (BRN/BLK)	Right front speaker ⊖
A10 (GRY/BLK)	Left front speaker ⊖
A11 (—)	(Not used)
A12 (—)	(Not used)
A13 (—)	(Not used)
A14 (BLK)	Ground (G701)
A15 (GRY/WHT)	Left rear speaker ⊖
A16 (BRN/WHT)	Right rear speaker ⊖



## Power Antenna Motor Test

1. Remove the trunk left side trim panel.
2. Disconnect the 4-P connector from the motor and remove the connector from its clamp.
3. First check power to the motor at the connector terminals: There should be battery voltage between the WHT/BLU (+) and BLK (-) terminals all the time. There should be battery voltage between the YEL/WHT (+) and BLK (-) terminals only with the ignition and radio switched ON.

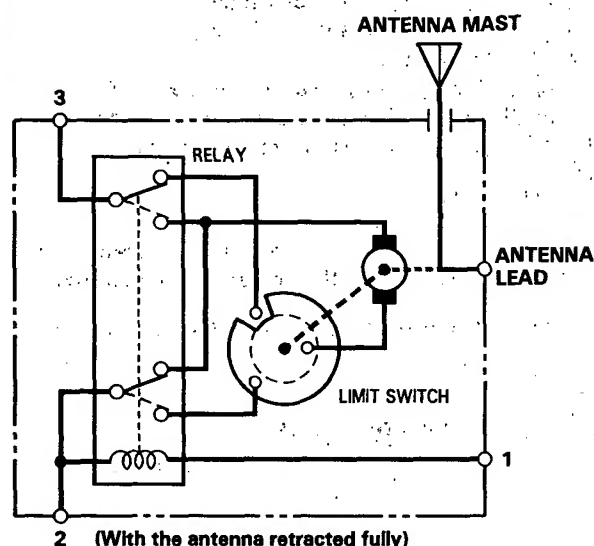


4. Test motor operation:

**FULL EXTEND:** Connect battery power to the No.3 and No.1 terminals and ground to the No.2 terminal.

**RETRACTED:** Then disconnect battery power from the No.1 terminal.

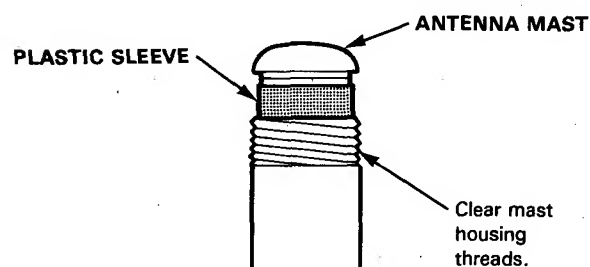
5. If the motor fails to operate properly, replace it.



### Sticking Antenna:

The antenna sticks in either the up or down position.

1. Using the antenna nut wrench, remove the special nut, spacer, and bushing (see page 23-174).
2. Clean the antenna mast housing threads and reinstall the spacer and bushing.



3. Use the antenna nut wrench and torque the special nut to 2.3 N·m (0.23 kg·m, 1.7 lb·ft). If the special nut is over-torqued, the antenna may stick. If sticking occurs, back the nut off until the antenna moves freely.

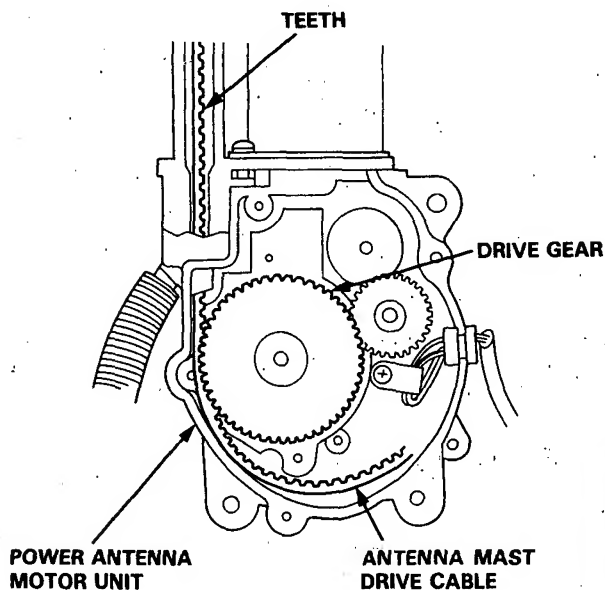
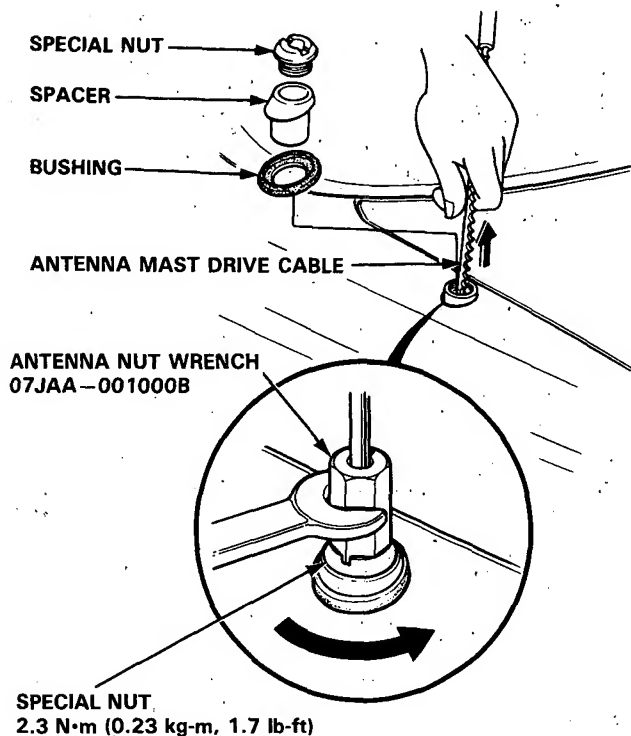
# Stereo Sound System

## Antenna Mast Replacement

### Removal:

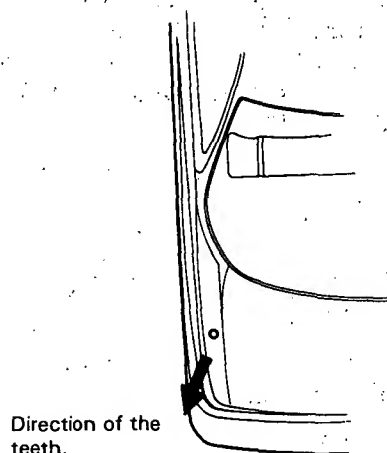
NOTE: The antenna mast alone can be replaced without removing the power antenna motor unit.

1. Remove the special nut, spacer, and bushing.
2. Carefully withdraw the antenna mast while extending it by turning the radio switch "ON".



### Installation:

1. Hold the antenna so the teeth on the drive cable face in the direction shown, and insert the drive cable into the antenna housing.

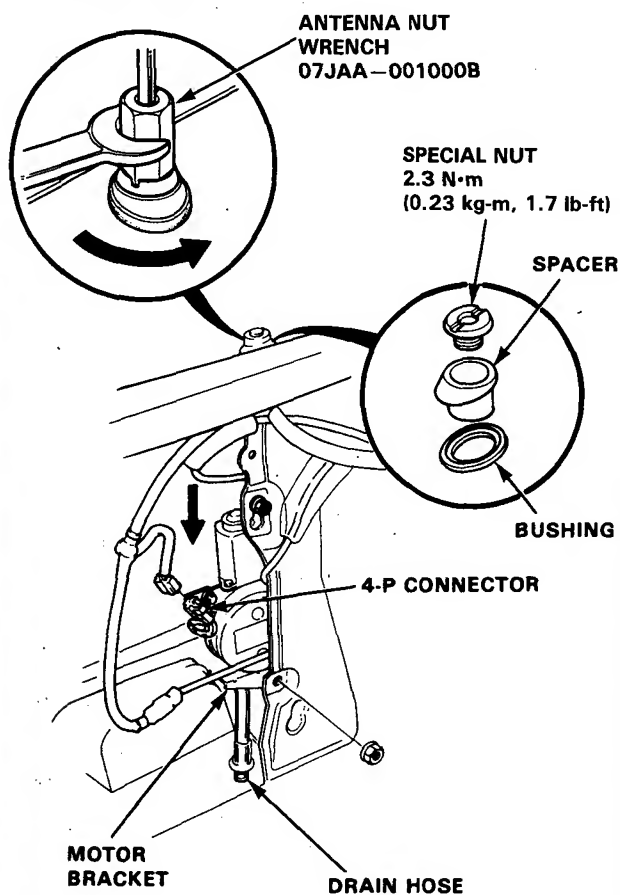


2. Check for engagement of the cable teeth to the drive gear by carefully moving the cable up and down.
  3. Turn the radio switch "OFF", and let the motor pull the drive cable inside the antenna housing.
  4. Clean the antenna mast housing threads, insert the antenna mast into the antenna housing, install the bushing and spacer, and torque the special nut to 2.3 N·m (0.23 kg-m, 1.7 lb-ft).
- NOTE: If the special nut is over-torqued, the antenna may stick. If sticking occurs, back the nut off until the antenna moves freely.
5. Check that the antenna mast retracts and extends fully when the radio switch is turned ON and OFF repeatedly.



## Power Antenna Motor Replacement

1. Remove the trunk left side trim panel.
2. Disconnect the 4-P connector and the antenna lead from the motor, then remove the special nut and the two mounting nuts to take out the motor with the antenna mast.

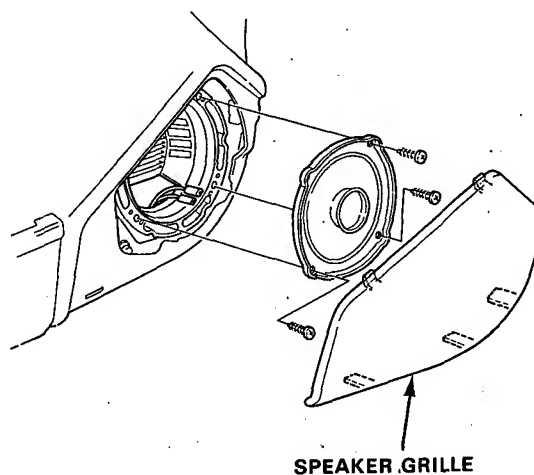


3. Install in reverse order of removal.

**NOTE:** First tighten the special nut, then tighten the two mounting nuts to the motor bracket.

## Front Speaker Replacement

1. Remove the speaker grille from the door panel.
2. Remove the three screws, then disconnect the wires from the speaker.

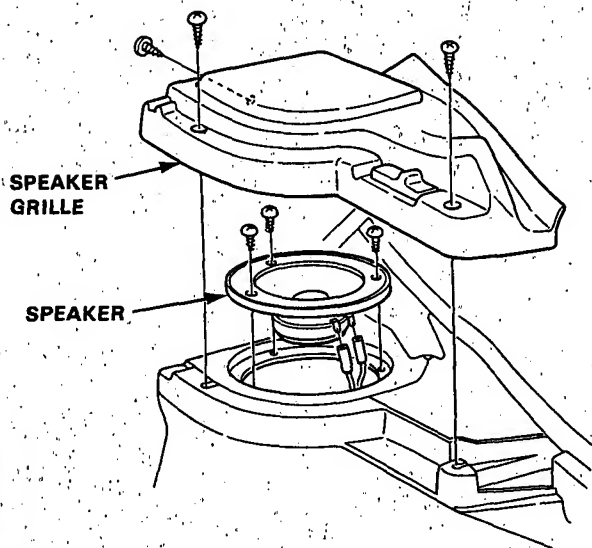


# Stereo Sound System

## Rear Speaker Replacement

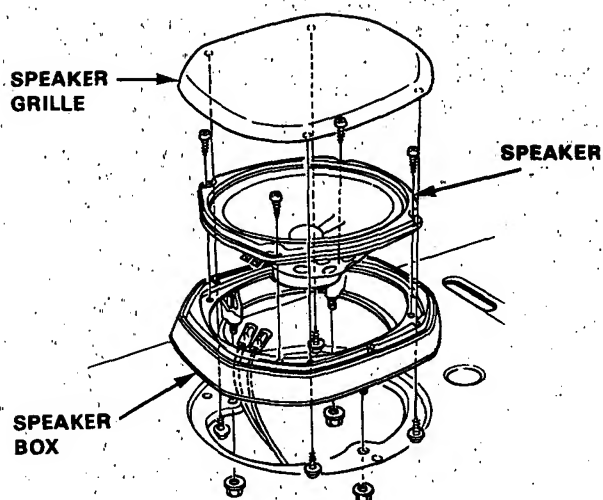
### Hatchback:

1. Remove the three screws and the speaker grille.
2. Remove the three screws, then disconnect the wires from the speaker.



### Sedan:

1. Open the trunk lid; remove the three nuts and disconnect the wires from the speaker assembly.
2. Remove the speaker grille and the speaker from the speaker box.

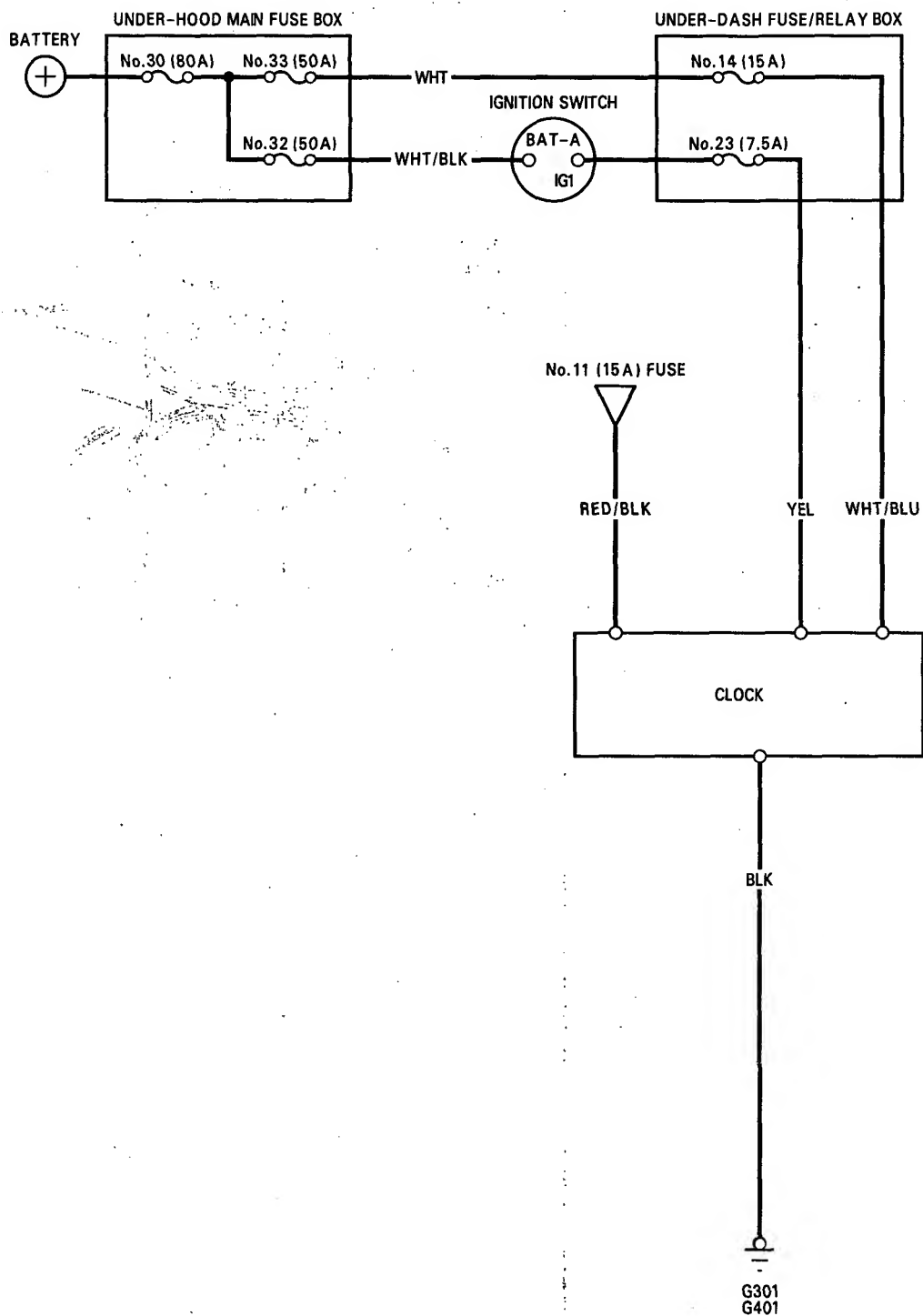






# Clock

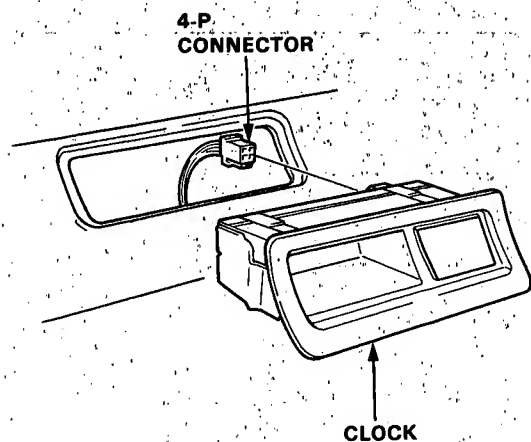
## Circuit Diagram



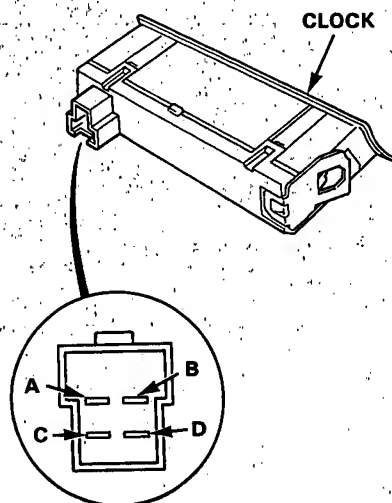
# Clock

## Removal

1. Pull the clock out of the dashboard, then disconnect the 4-P connector.



## Terminals:

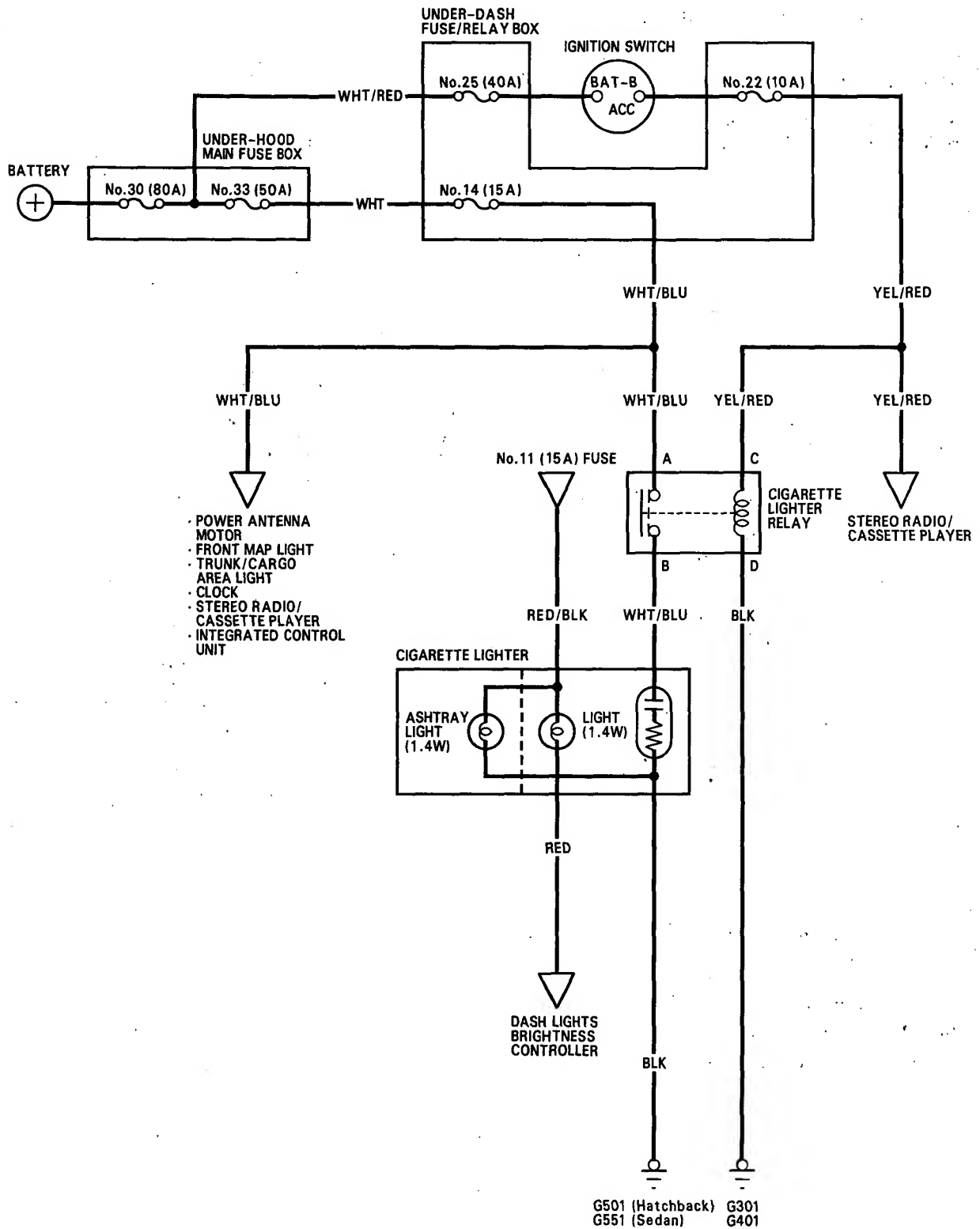


Terminal	Wire	Connects to
A	RED/BLK	Lights-on signal
B	BLK	Ground
C	YEL	IG1 (Main clock power supply)
D	WHT/BLU	Constant power (Time memory)



# Cigarette Lighter

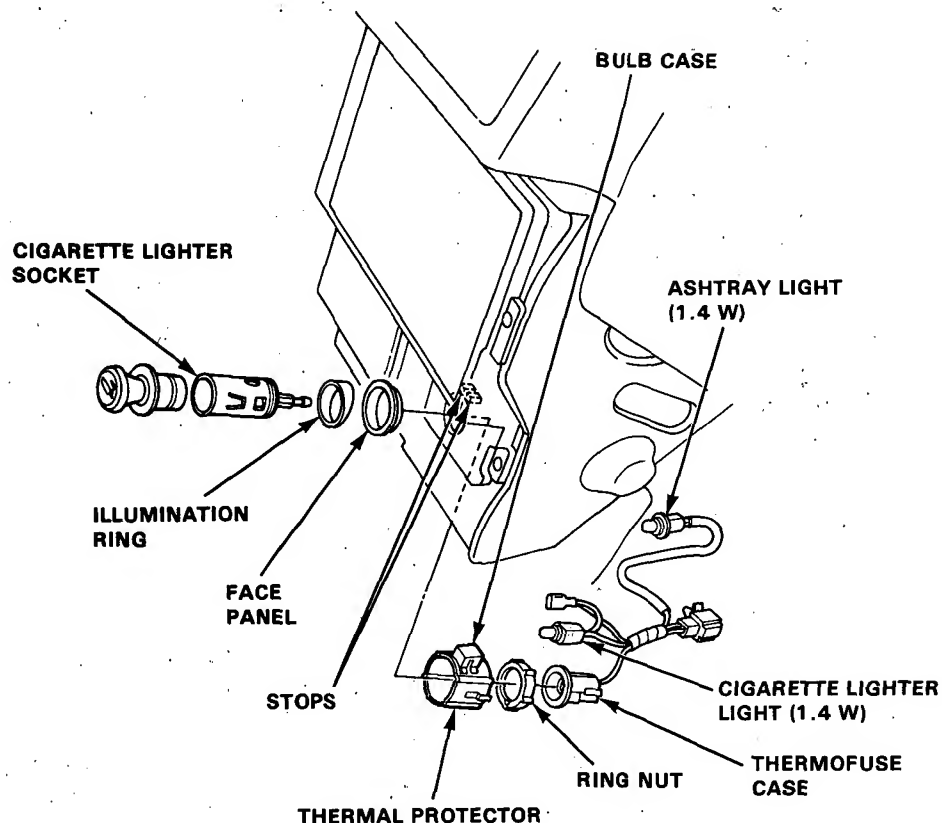
## Circuit Diagram



# Cigarette Lighter

## Replacement

1. Remove the front console and center instrument panel.
2. Disconnect the 4-P connector and remove the ashtray light.
3. Disconnect the thermofuse case from the socket end.
4. Remove the ring nut and separate the cigarette lighter socket from the thermal protector.

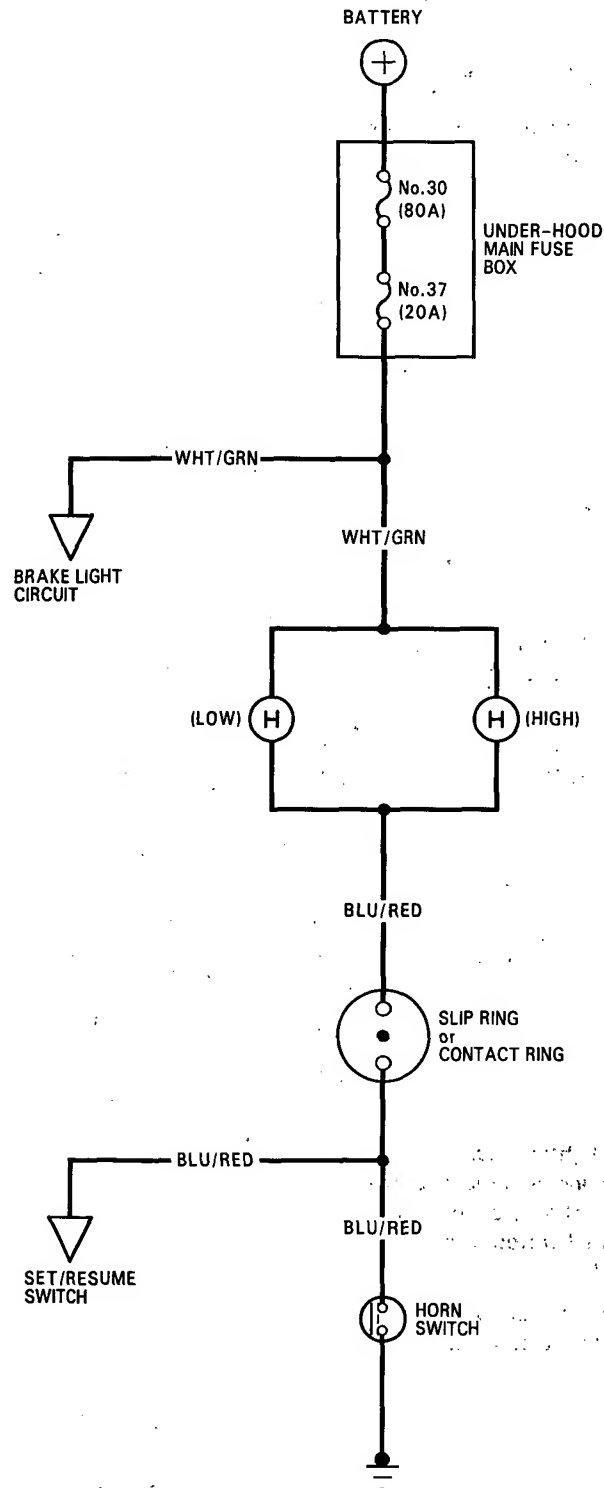


5. When installing the cigarette lighter, align each lug on the face panel, illumination ring, and the cigarette lighter socket with the slot in the hole, then position the bulb case on the thermal protector between the stops of the center panel.
6. Make sure that the ground wire, bulb socket, and thermofuse case are seated to the cigarette lighter assembly.

# Horns



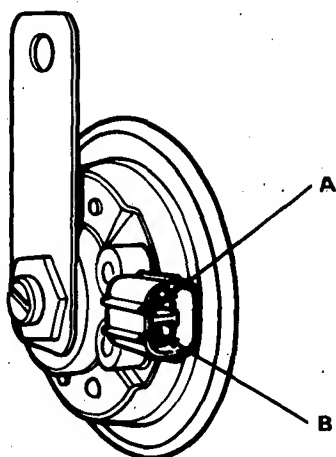
## Circuit Diagram



# Horns

## Test

1. Remove the front bumper.
2. Disconnect the 2-P connector from the horn.
3. Remove the low and high horns.
4. Test the horn by connecting battery power to one terminal and grounding the other. The horn should sound.



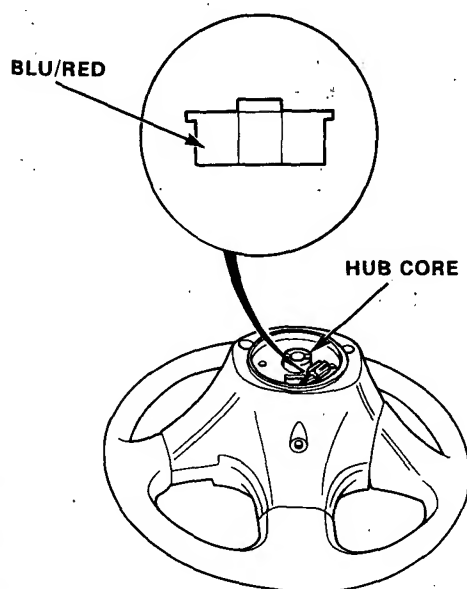
5. Replace the horn if it fails to sound.

## Switch Test

1. Remove the steering wheel, then turn it over.
2. Check for continuity between the hub core and the contact ring (or the hub core and the BLU/RED lead for cars equipped with cruise control) according to the table.

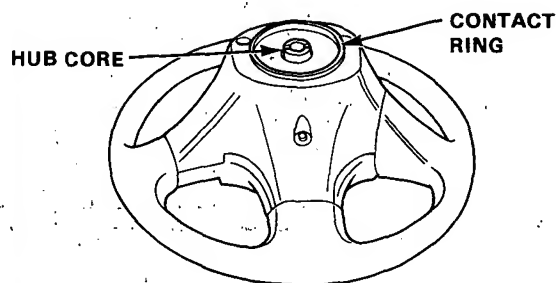
### With Cruise Control :

Terminal Position	HUB CORE	BLU/RED
PRESS		
FREE		



### Without Cruise Control :

Terminal Position	HUB CORE	BLU/RED
PRESS		
FREE		

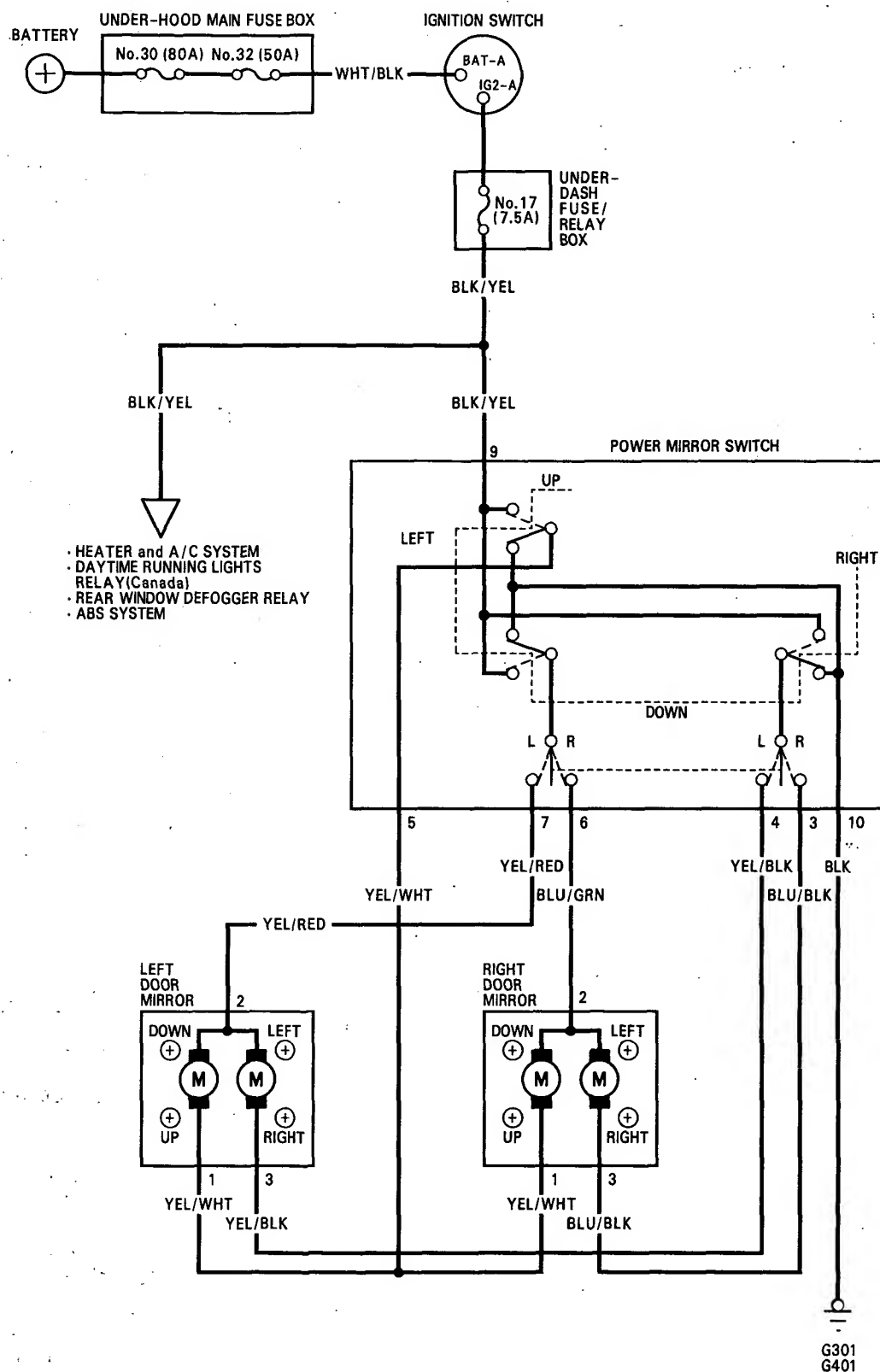


3. If OK, reinstall the steering wheel, then test the switch.



# Power Mirrors

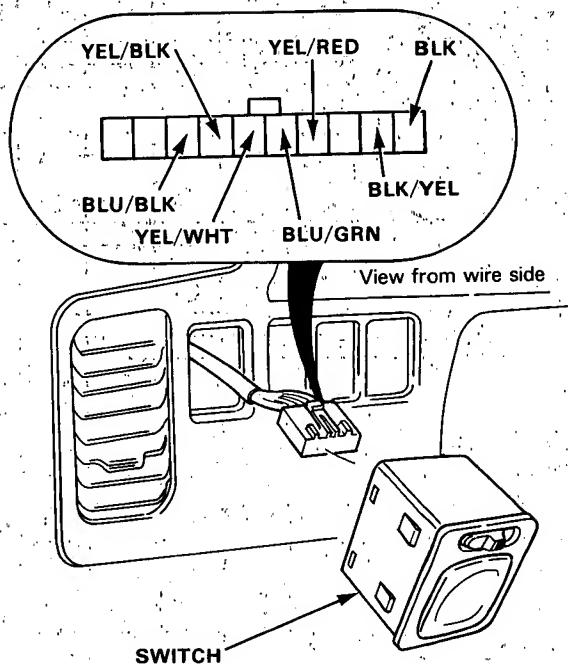
## Circuit Diagram



# Power Mirrors

## Mirror Function Test

1. Remove the dashboard lower cover and push out the switch from behind the instrument panel.
2. Disconnect the 10-P connector to remove the switch:



### One or both mirrors inoperative:

1. Check for voltage between the BLK/YEL terminal and body ground with the ignition switch ON. There should be battery voltage.
  - If there is no voltage, check for:
    - Blown No. 17 (7.5A) fuse in the under-dash fuse/relay box.
    - An open in the BLK/YEL wire.
  - If there is battery voltage, go to step 2.

2. Check for continuity between the BLK terminal and body ground. There should be continuity. If there is no continuity, check for:
  - An open in the BLK wire.
  - Poor ground (G301, G401).

### Left mirror inoperative:

Connect the BLK/YEL terminal to the YEL/RED terminal and the YEL/WHT or YEL/BLK terminal to the body ground with jumper wires. The left mirror should tilt down (or swing left) with the ignition switch ON.

- If the mirror does not tilt down (or swing left), remove the left door panel and check for an open in the wires between the left mirror and the switch (YEL/WHT, YEL/BLK). If the wire is OK, check the left mirror actuator.
- If the mirror neither tilts down nor swings left, repair the YEL/RED wire between the switch and the left mirror.
- If the mirror operates properly, check the mirror switch.

### Right mirror inoperative:

Connect the BLK/YEL terminal to the BLU/GRN terminal and the YEL/WHT or BLU/BLK terminal to the body ground with jumper wires. The right mirror should tilt down (or swing left) with the ignition switch ON.

- If the mirror does not tilt down (or swing left), remove the right door panel and check for an open in the wires between the right mirror and the switch (YEL/WHT, BLU/BLK). If the wire is OK, check the right mirror actuator.
- If the mirror neither tilts down nor swings left, repair the BLU/GRN wire between the switch and the right mirror.
- If the mirror operates properly, check the mirror switch.

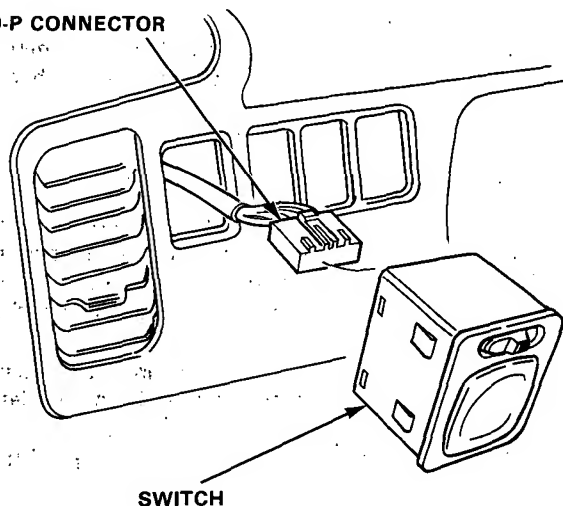




## Switch Removal

1. Remove the dashboard lower cover.
2. Push out the switch from behind the instrument panel, then disconnect the 10-P connector to remove the switch.

10-P CONNECTOR

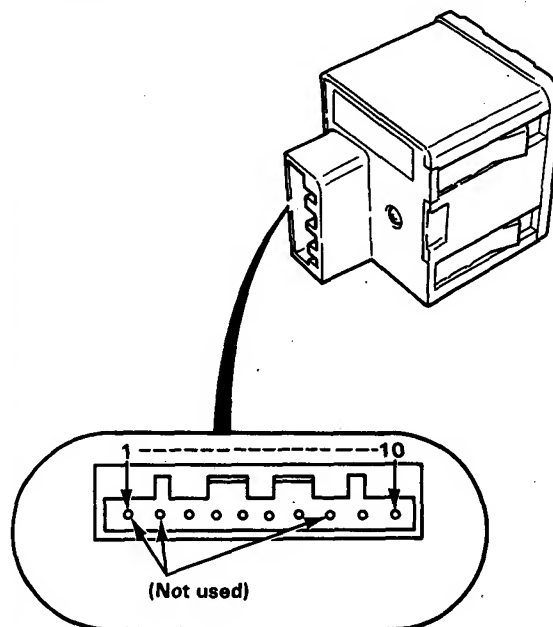


## Switch Test

1. Remove the power mirror switch from the instrument panel.
2. Check for continuity between the terminals in each switch position according to the table.

Mirror Switch

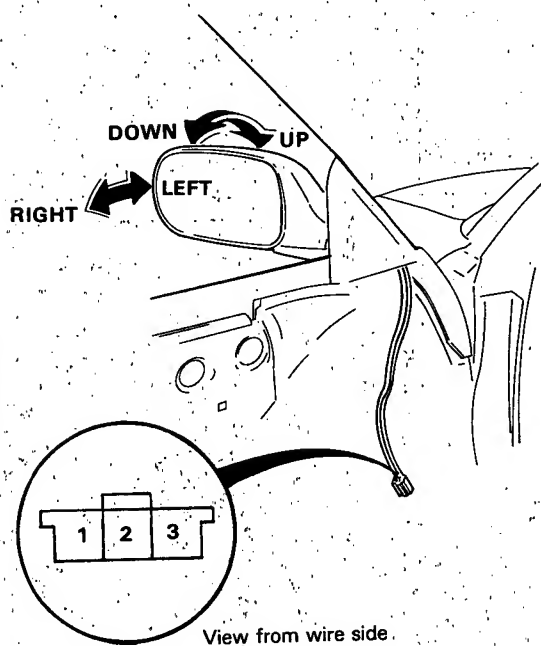
Terminal Position		3	4	5	6	7	9	10
Right	OFF	○		○	○			○
	UP			○			○	
	DOWN	○					○	
	LEFT			○			○	
	RIGHT	○			○		○	
Left	OFF		○	○		○		○
	UP			○			○	
	DOWN		○			○	○	
	LEFT			○			○	
	RIGHT		○				○	



# Power Mirrors

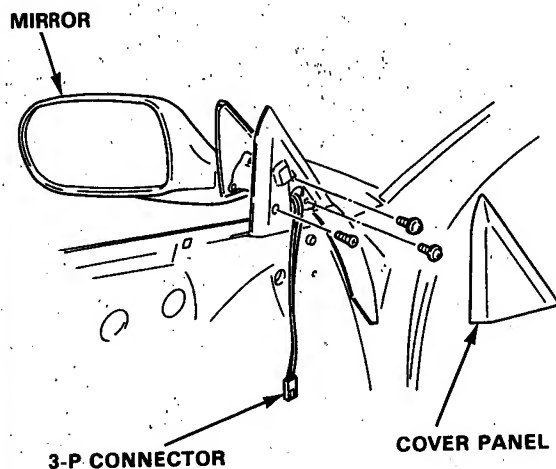
## Mirror Actuator Test

1. Remove the door panel, then disconnect the 3-P connector from the mirror actuator.
2. Test actuator operation:  
TILT UP: Connect battery power to the No.1 terminal and ground to the No.2 terminal;  
TILT DOWN: Connect battery power to the No.2 terminal and ground to the No.1 terminal;  
SWING LEFT: Connect battery power to the No.2 terminal and ground to the No.3 terminal;  
SWING RIGHT: Connect battery power to the No.3 terminal and ground to the No.2 terminal.
3. If the mirror fails to operate properly, replace it.



## Mirror Replacement

1. Remove the door panel, then disconnect the 3-P connector from the mirror.
2. Carefully pry out the cover panel with a flat tip screwdriver.
3. While holding the mirror with one hand, remove its mounting screws with the other.



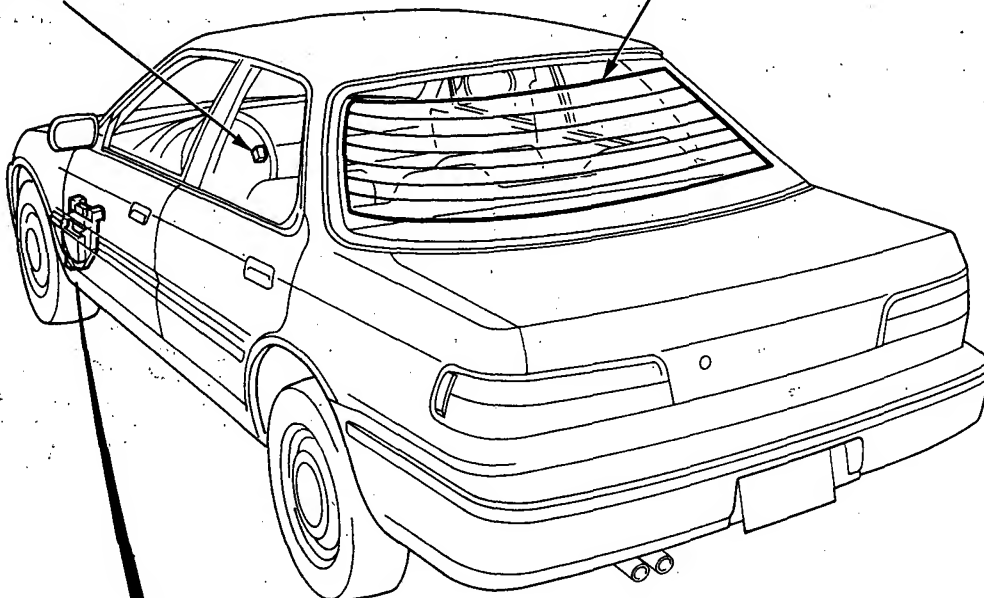
# Rear Window Defogger



## Component Location Index

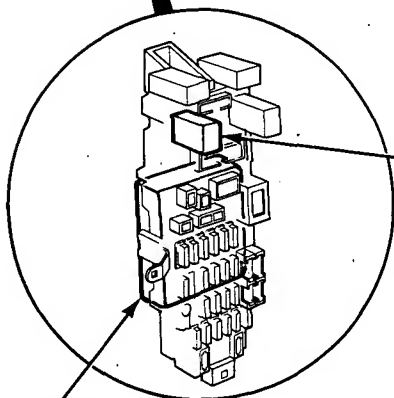
**REAR WINDOW  
DEFOGGER SWITCH**  
Test, page 23-190

**REAR WINDOW DEFOGGER**  
Function Test, page 23-191



**REAR WINDOW  
DEFOGGER RELAY**  
Test, page 23-190

**REAR WINDOW  
DEFOGGER TIMER CIRCUIT**  
(Built into the integrated control unit)  
Input Test, page 23-134



## Description

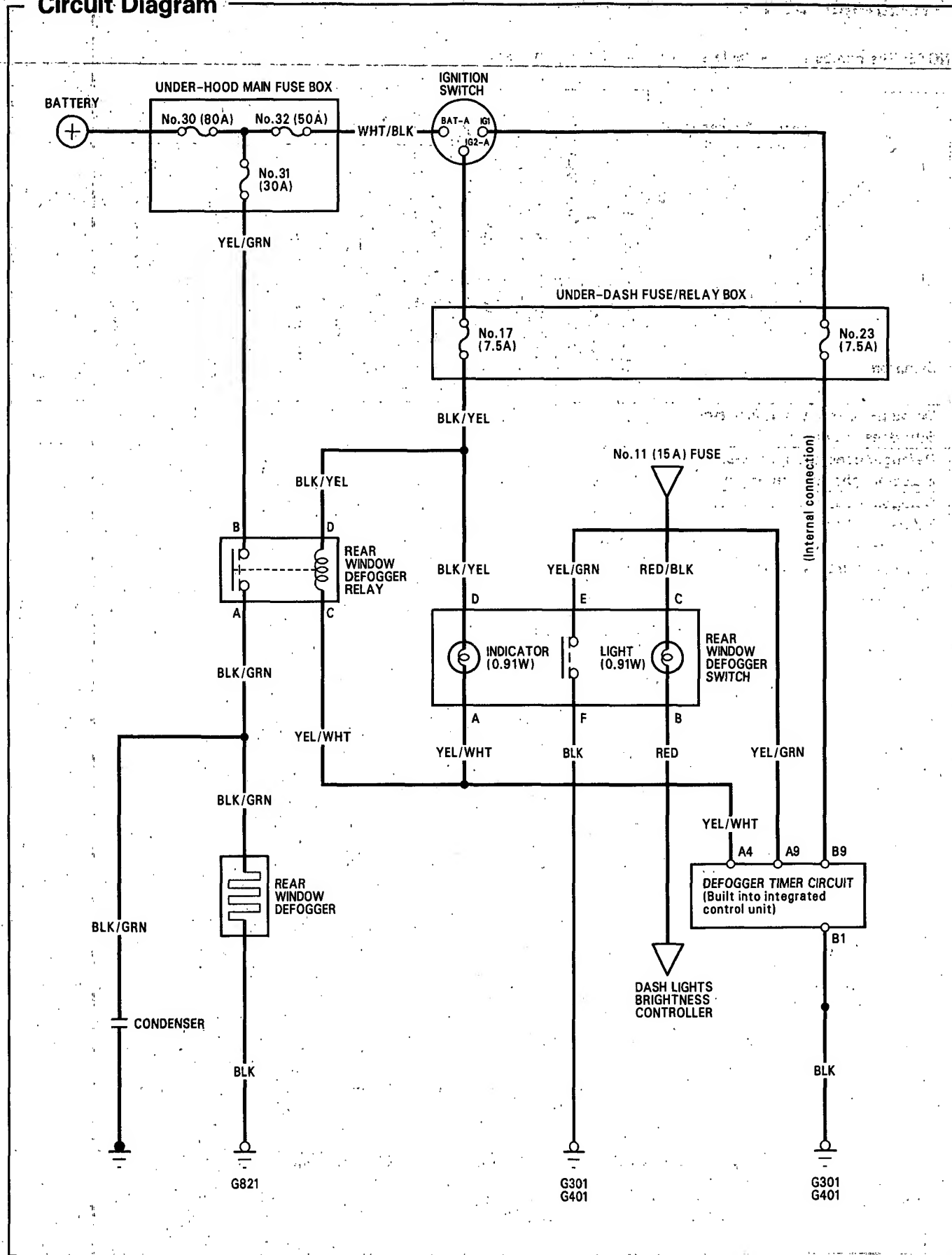
### Function:

The rear window defogger is controlled by the integrated control unit. When the defogger switch in the instrument panel is pushed, it sends a signal to the defogger timer in the integrated control unit and the defogger stays on for about 25 minutes or until the ignition is switched off.

The indicator light in the switch glows when the defogger is operating.

## Rear Window Defogger

### Circuit Diagram





## troubleshooting

JTE: The numbers in the table show the troubleshooting sequence.

Symptom	Item to be inspected								Open circuit, loose or disconnected terminals
	Blown indicator light bulb	Blown No.17 (7.5A) fuse (In the under-dash fuse/relay box)	Defogger timer circuit input (In the integrated control unit)	Blown No.23 (7.5A) fuse (In the under-dash fuse/relay box)	Blown No.31 (30A) fuse (In the under-hood main fuse box)	Function test	Defogger relay	Broken defogger wire	Poor ground
Defogger operates, but indicator light does not go on.	1								BLK/YEL or YEL/WHT
Defogger does not operate and indicator light does not go on.		1	3	2					G301 G401 YEL/WHT
Defogger does not operate, but indicator light goes on.					1	2	3	4	G821 YEL/WHT or BLK/GRN
Operation time is too long or too short. (normal operation time is about 25 minutes).			1						YEL/GRN or BLK

# Rear Window Defogger

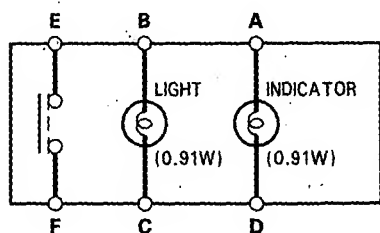
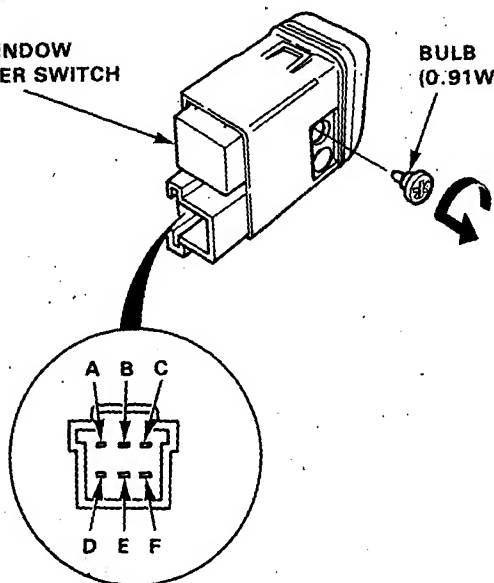
## Switch Test

1. Remove the switch from the instrument panel (see page 23-115).
2. Check for continuity between the terminals according to the table.

Terminal	E	F	A		D	B		C
Position	E	F	A		D	B		C
PUSHED	○	○	○	○	○	○	○	○
RELEASED			○	○	○	○	○	○

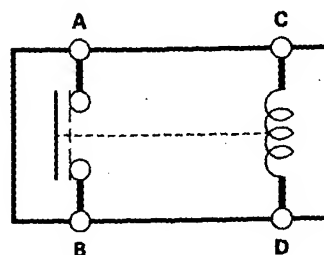
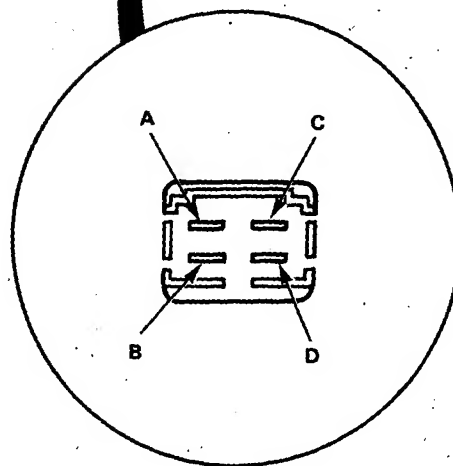
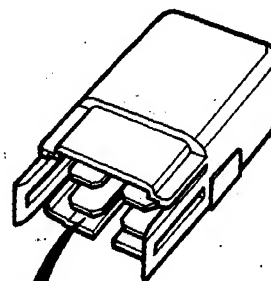
REAR WINDOW DEFOGGER SWITCH

BULB (0.91W)



## Relay Test

1. Remove the relay from the under-dash fuse/relay box.
2. There should be continuity between the C and D terminals.
3. There should be continuity between the A and B terminals when battery power and ground are connected to the C and D terminals. There should be no continuity when power is disconnected.

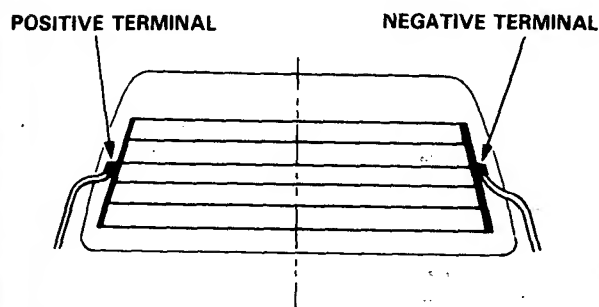




## Function Test

**CAUTION:** Be careful not to scratch or damage the defogger wires with the tester probe end.

1. Check for voltage between the positive terminal and body ground with the ignition switch and the defogger switch ON.  
There should be battery voltage.
  - If there is no voltage, check for:
    - Faulty defogger relay.
    - An open in the BLK/GRN or YEL/GRN wire.
  - If there is battery voltage, go to step 2.

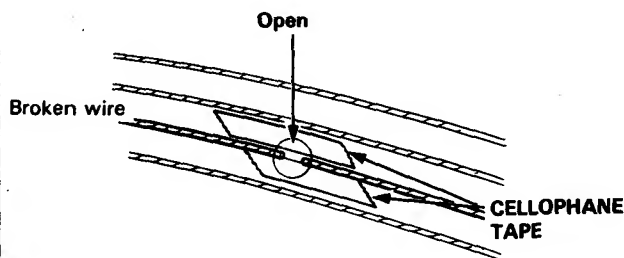


2. Check for continuity between the negative terminal and body ground.  
If there is no continuity, check for an open in the defogger ground wire.
3. Connect the voltmeter positive probe to the center of each defogger wire, and the negative probe to the negative terminal.  
There should be approximately 6 V with the ignition switch and the defogger switch ON.
  - If the voltage is as specified, the defogger wire is OK.
  - If there is battery voltage, the defogger wire is broken in the negative side of the center.
  - If there is no voltage the defogger wire is broken in the positive side of the center.

## Defogger Wire Repair

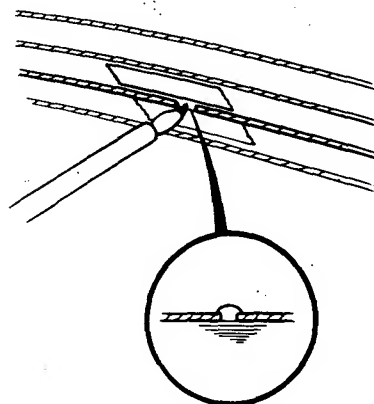
**NOTE:** The repair section must be no longer than 25 mm (1.0 in).

1. Lightly scour the area around the break with fine steel wool, then clean it with alcohol.
2. Carefully mask above and below the broken portion of the defogger wire with cellophane tape.



3. Using a small brush, apply heavy coat of silver conductive paint extending about 3 mm (0.125 in) on both sides of the break. Allow 30 minutes to dry.

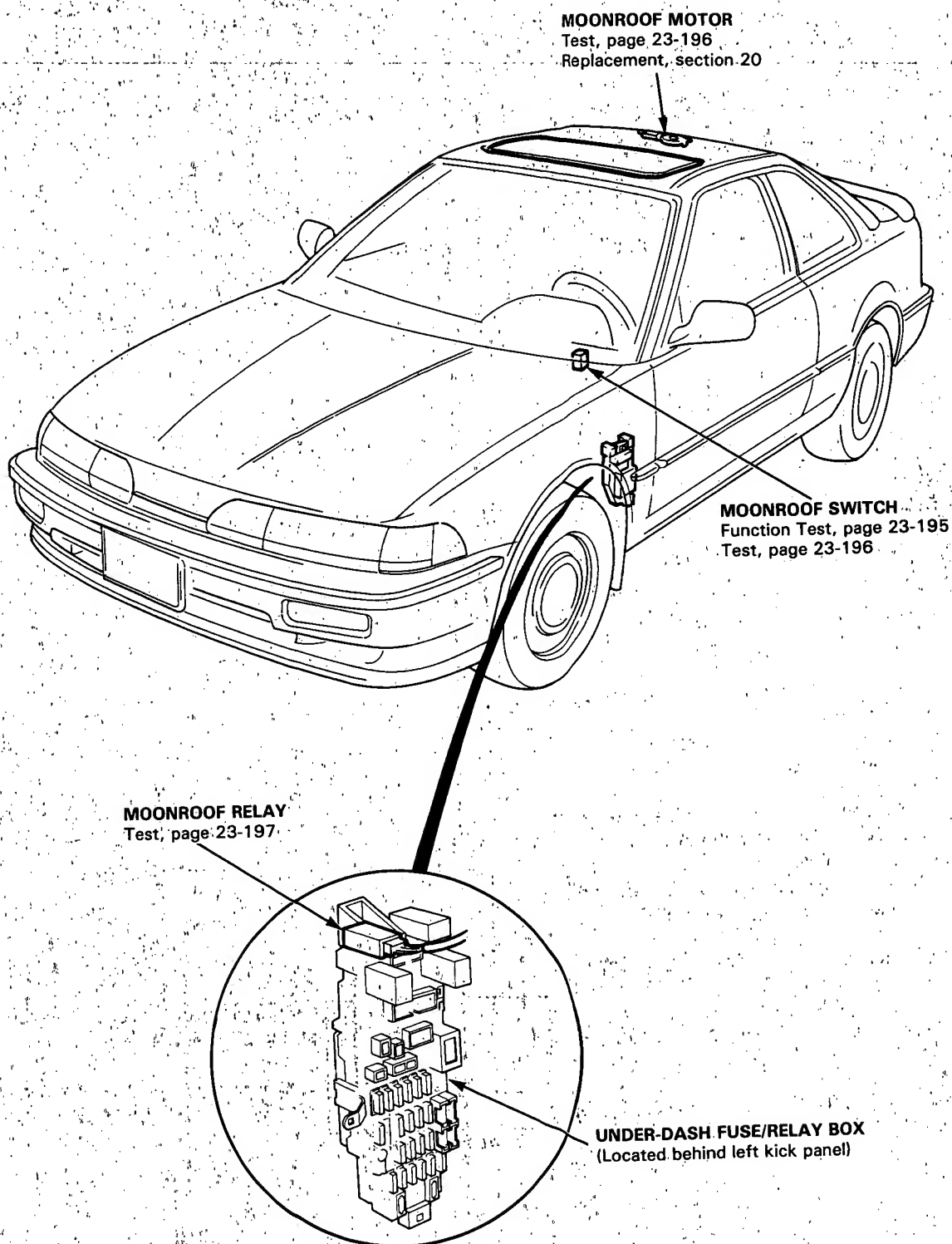
**NOTE:** Thoroughly mix paint before use.



4. Check for proper operation with a voltmeter (half of battery voltage at the halfway-point).
5. Apply a second coat of paint in the same way. Let it dry three hours before removing the tape.

# Moonroof

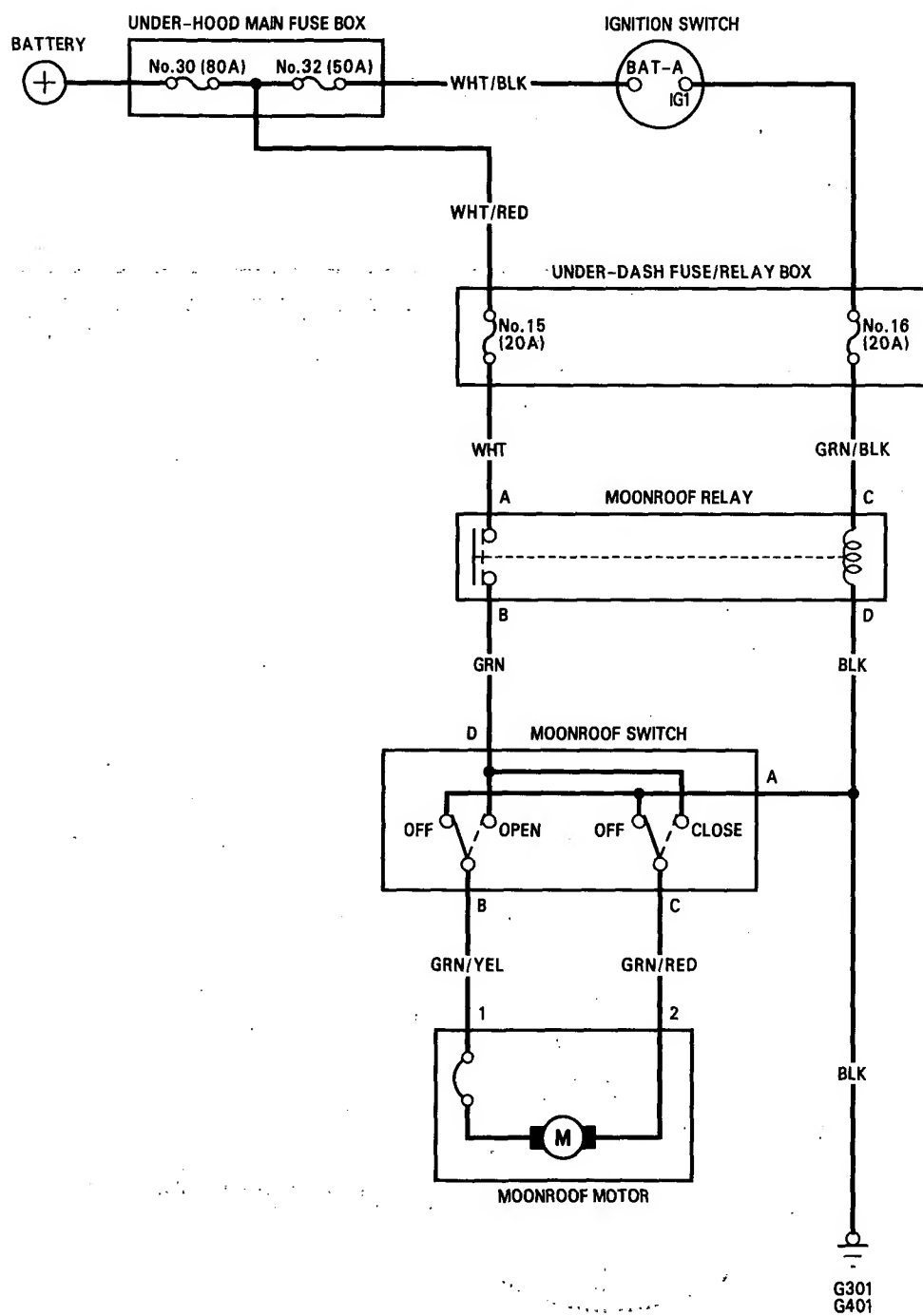
## Component Location Index







## Circuit Diagram



# Moonroof

## Electrical Troubleshooting

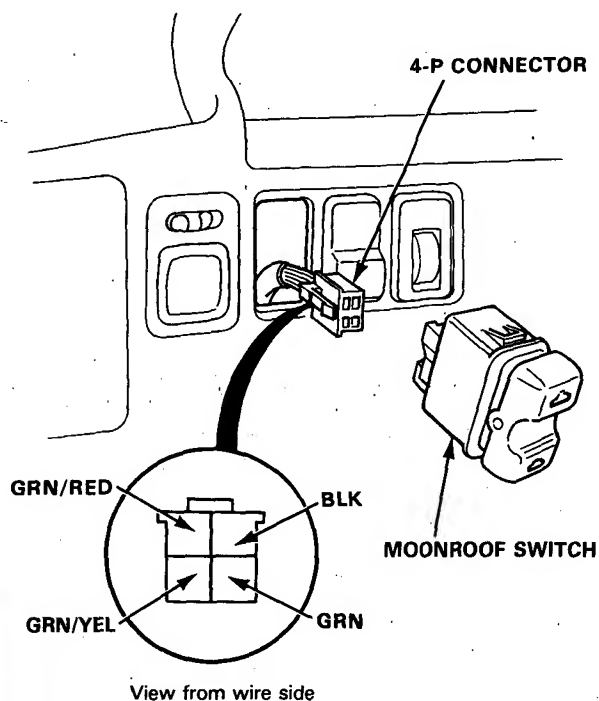
NOTE: The numbers in the table show the troubleshooting sequence.

Item to be inspected Symptom		Clutch out of adjustment, foreign matter stuck between guide rail and moonroof, or outer cable not attached properly	Blown No. 15 (20A) fuse (In the under-dash fuse/relay box)	Blown No. 16 (20A) fuse (In the under-dash fuse/relay box)	Function test	Moonroof relay	Moonroof motor	Moonroof switch	Poor ground	Open circuit, loose or disconnected terminals.
Moonroof does not move, but motor runs.		1								
Moonroof does not move and motor does not run (moonroof can be moved with moonroof wrench).	In all switch positions.		1	2	3	4	5		G301 G401	WHT, GRN/BLK, GRN, BLK
	With OPEN switch.					2		1		GRN/YEL.
	With CLOSE switch.					2		1		GRN/RED



## Function test

1. Remove the dashboard lower cover.
2. Push out the switch from behind the instrument panel, then disconnect the 4-P connector to remove the switch.



3. Check for continuity between the BLK terminal and body ground.
  - If there is no continuity, check for:
    - An open in the BLK wire.
    - Poor ground (G301, G401).
  - If there is continuity, go to step 4.

4. Check for voltage between the GRN terminal and BLK terminal with ignition switch ON. There should be battery voltage.

- If there is no battery voltage, check for:
  - Blown No. 16 (20A) or No. 15 (20A) fuse.
  - An open in the wires (GRN/BLK, GRN, WHT) or loose terminals.
  - Faulty moonroof relay.

- If there is battery voltage, go to step 5.

5. Connect the GRN terminal to the GRN/YEL terminal, and the GRN/RED terminal to the BLK terminal with jumper wires.

The moonroof should open when the ignition switch is turned ON.

- If the moonroof opens, check the moonroof switch.
- If it doesn't open, remove the headlining and check the motor.

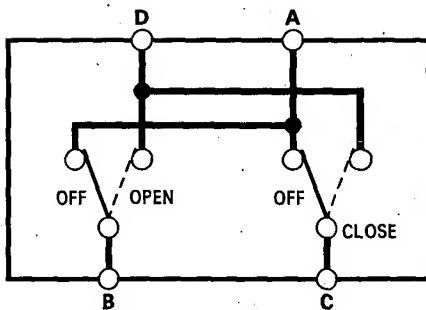
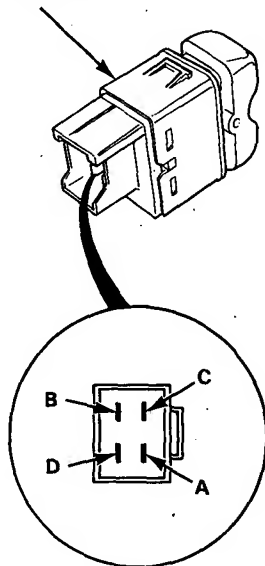
# Moonroof

## Switch Test

1. Remove the dashboard lower cover.
2. Push out the switch from behind the instrument panel, then disconnect the 4-P connector to remove the switch.
3. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	A	B	C	D
OFF	○	○	○	
OPEN		○		○
CLOSE			○	○

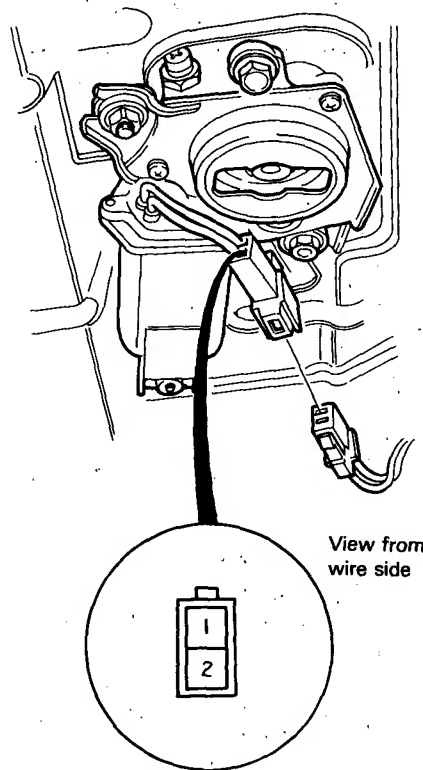
MOONROOF SWITCH



## Motor Test

1. Remove the headlining.
2. Disconnect the 2-P connector from the moonroof motor.
3. Test the motor by connecting battery power and ground to the No. 1 and No. 2 terminals: Test the motor in each direction by switching the leads from the battery.

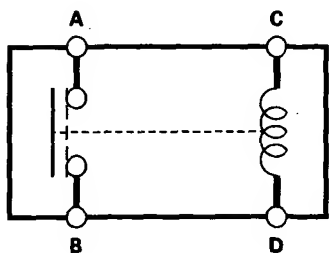
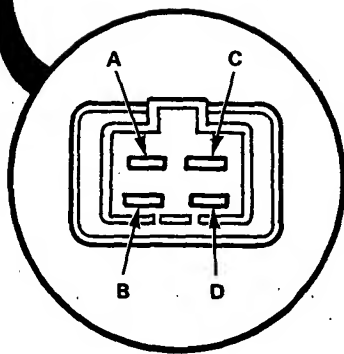
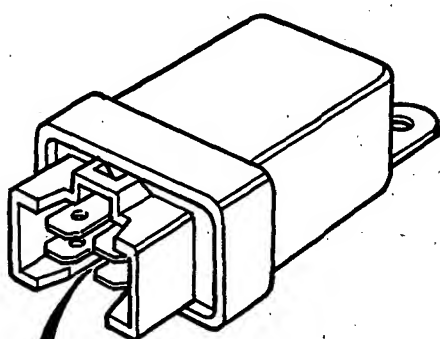
NOTE: See closing force check in section 20 for motor clutch test.





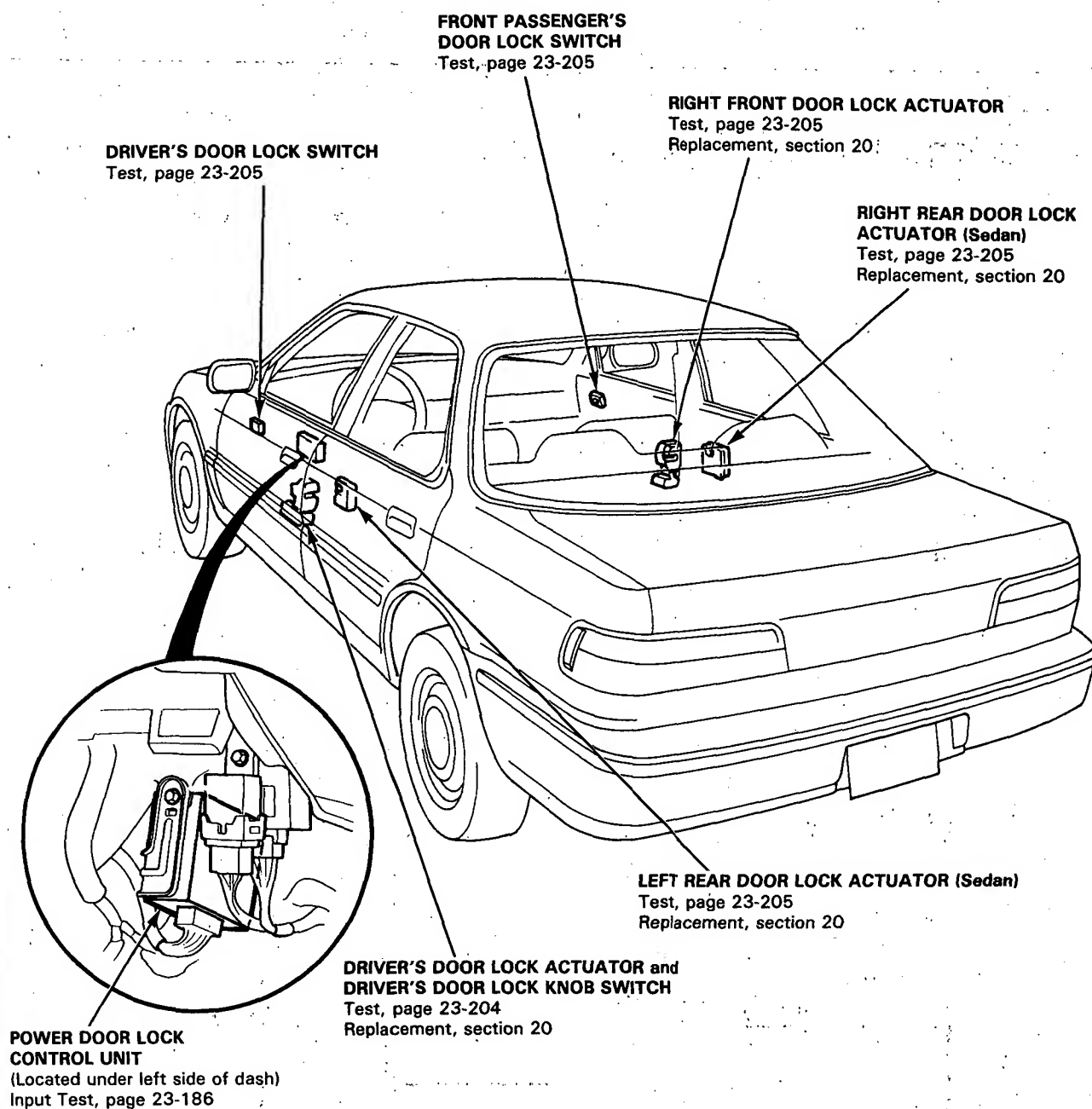
## Relay Test

1. Remove the relay from the under-dash fuse/relay box.
2. There should be continuity between the C and D terminals.
3. There should be continuity between the A and B terminals when battery power and ground are connected to the C and D terminals. There should be no continuity when power is disconnected.



# Power Door Locks

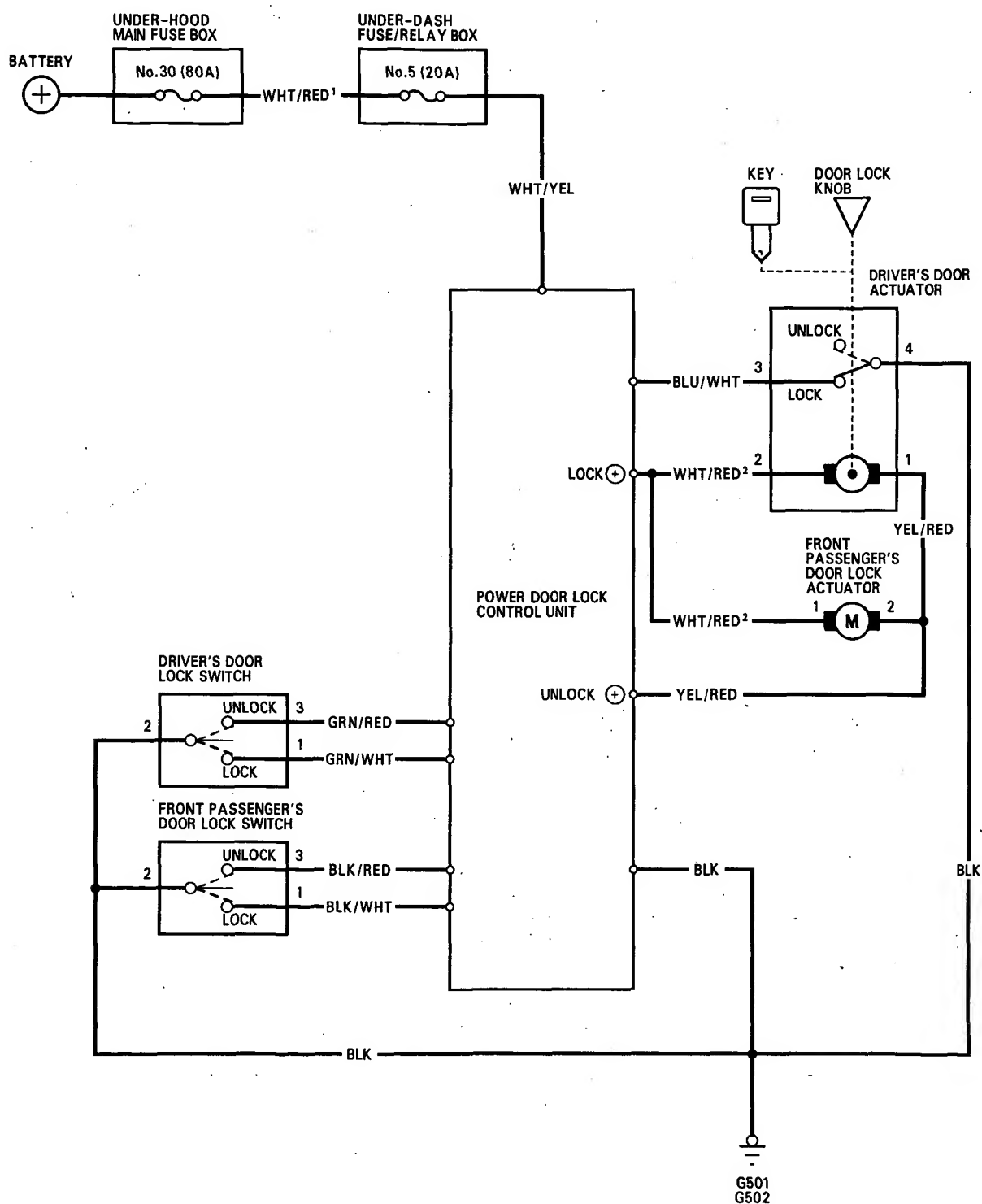
## Component Location Index





## Circuit Diagram (Hatchback)

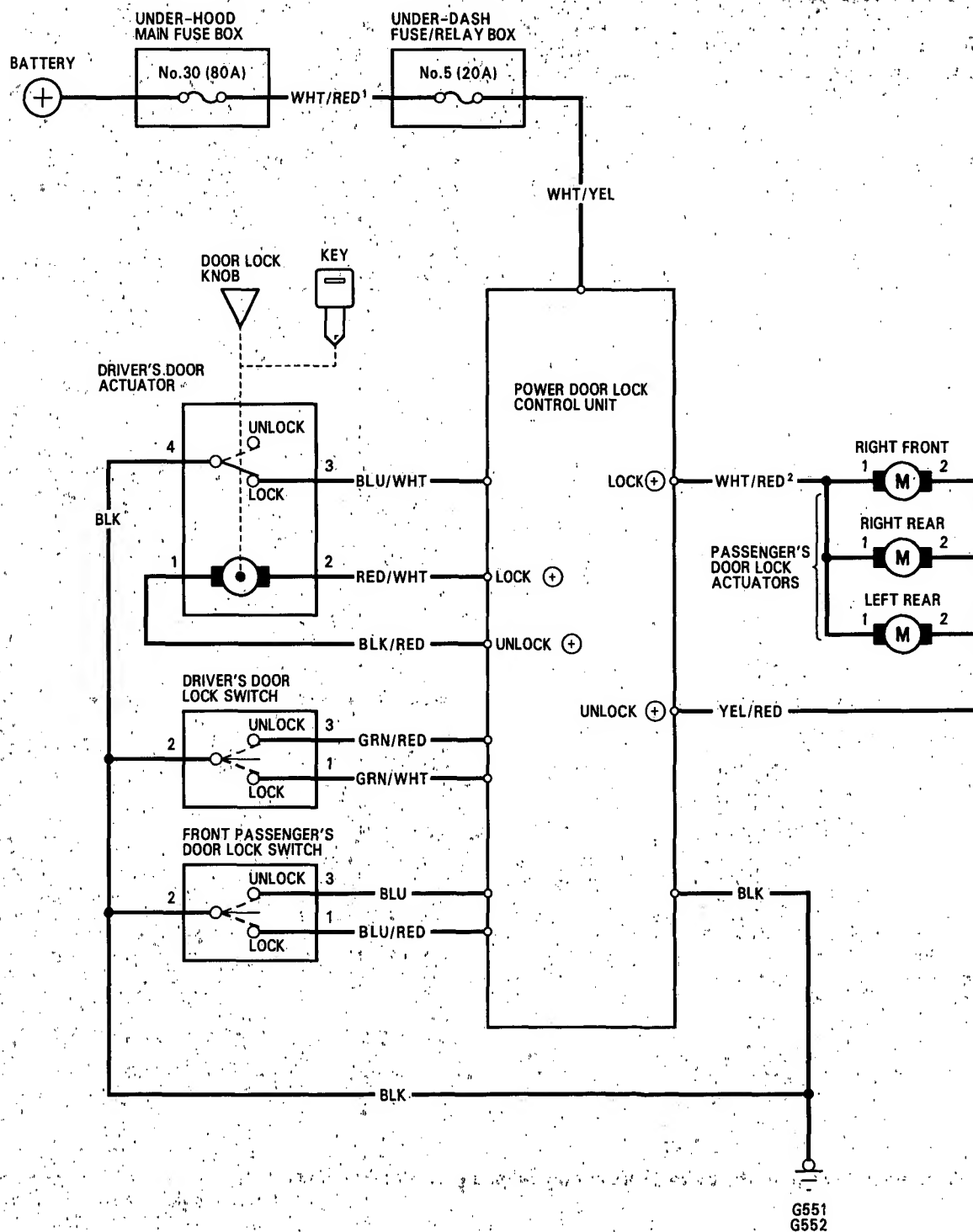
**NOTE:** Different wires with the same color have been given a number suffix to distinguish them (for example, WHT/RED<sup>1</sup> and WHT/RED<sup>2</sup> are not the same).



# Power Door Locks

## Circuit Diagram (Sedan)

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, WHT/RED<sup>1</sup> and WHT/RED<sup>2</sup> are not the same).







## Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence.

Symptom		Item to be inspected	Blown No.5 (20A) fuse (In the under-dash fuse/relay box)	Door lock knob switch (In the driver's door actuator)	Control unit input	Passenger door actuator	Disconnected or obstructed door lock rod/linkage	Driver's door lock switch	Passenger's door lock switch	Poor ground	Open circuit, loose or disconnected terminals
Power door lock system does not operate at all.			1		2					※1	WHT/RED <sup>1</sup> or WHT/YEL
Doors do not lock with driver's door lock knob switch.	All passenger doors.		1	2	3		4			※1	BLU/WHT, YEL/RED or WHT/RED <sup>2</sup>
	One or more passenger doors.					1	2				YEL/RED or WHT/RED <sup>2</sup>
Doors do not lock or unlock with driver's door lock switch.	All doors.		1		3		4	2		※1	GRN/RED, GRN/WHT, YEL/RED, WHT/RED <sup>2</sup> , BLK/RED (※2) or RED/WHT (※2)
	One or more doors.					1	2				YEL/RED, WHT/RED <sup>2</sup> , BLK/RED (※2) or RED/WHT (※2)
Doors do not lock or unlock with front passenger's door lock switch.	All doors.		1		3		4		2	※1	BLU(※2), BLU/RED(※2), BLK/RED (※3), BLK/WHT (※3), YEL/RED, WHT/RED <sup>2</sup> , BLK/RED (※2) or RED/WHT (※2)
	One or more doors.					1					YEL/RED, WHT/RED <sup>2</sup> , BLK/RED (※2) or RED/WHT (※2)

**CAUTION:** To prevent damage to the motor, connect power and ground only momentarily.

※1: G501, G502 (Hatchback)  
G551, G552 (Sedan)

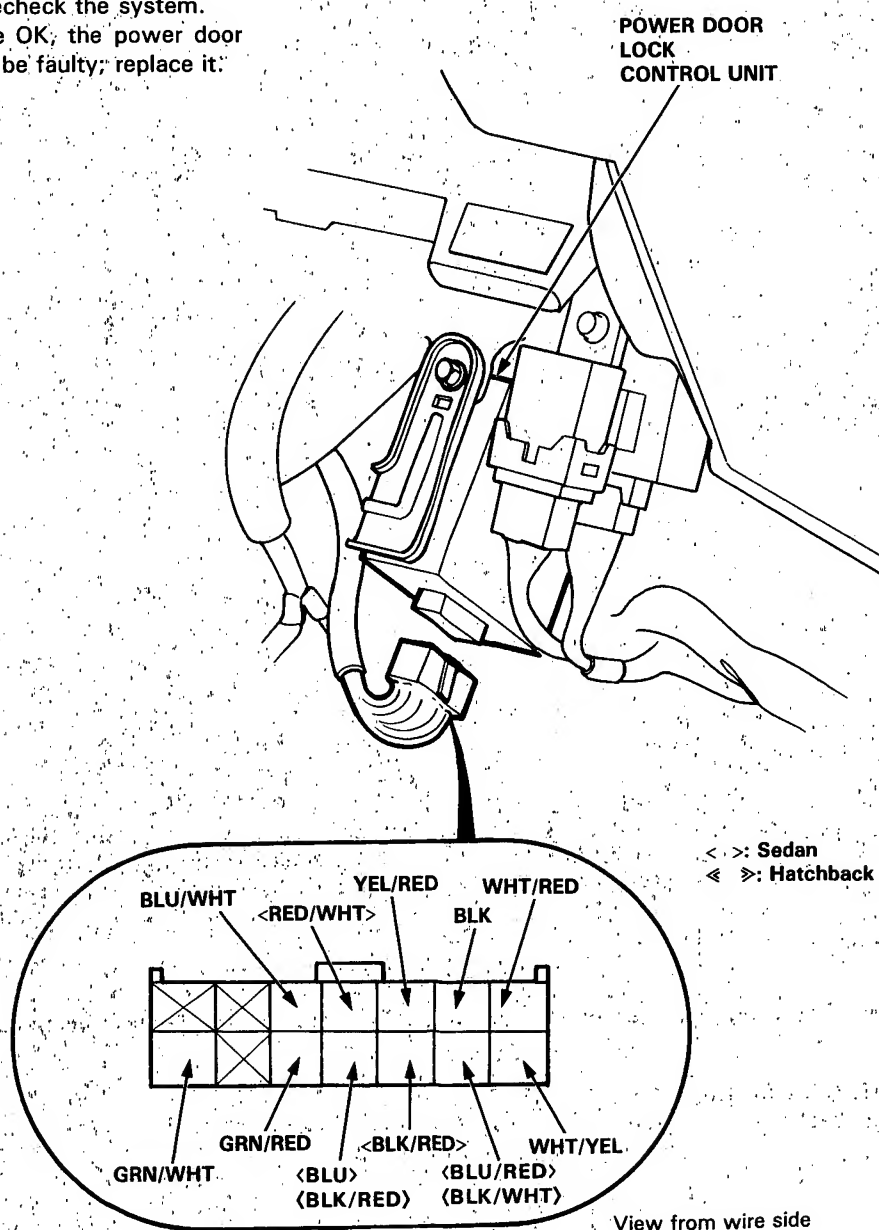
※2: Sedan

※3: Hatchback

# Power Door Locks

## Control Unit Input Test

1. Remove the dashboard lower cover and left knee bolster, then disconnect the 14-P connector from the power door lock control unit.
2. Inspect the connector and socket terminals to be sure they are all making good contact.
  - If the terminals are bent, loose or corroded, repair them as necessary, and recheck the system.
  - If the terminals lock OK, make the following input tests at the connector.
    - If any test indicates a problem, find and correct the cause, then recheck the system.
    - If all input tests prove OK, the power door lock control unit must be faulty; replace it.





No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (※2).</li> <li>• An open in the wire.</li> </ul>
2	WHT/YEL	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No.5 (20A) fuse.</li> <li>• An open in the wire.</li> </ul>
3	GRN/WHT	Driver's door lock switch in LOCK.	Check for continuity to ground: It should go from battery voltage to 1V or less as the switch is turned.	<ul style="list-style-type: none"> <li>• Faulty driver's door lock switch.</li> <li>• Poor ground (※2).</li> <li>• An open in the wire.</li> </ul>
4	GRN/RED	Driver's door lock switch in UNLOCK.		
5	BLU/RED <BLK/WHT>	Front passenger's door lock switch in LOCK.	Check for continuity to ground: It should go from battery voltage to 1V or less as the switch is turned.	<ul style="list-style-type: none"> <li>• Faulty front passenger's door lock switch.</li> <li>• Poor ground (※2).</li> <li>• An open in the wire.</li> </ul>
6	BLU <BLK/RED>	Front passenger's door lock switch in UNLOCK.		
7	BLU/WHT	Driver's door lock knob in LOCK.	Check for continuity to ground: It should go from battery voltage to 1V or less.	<ul style="list-style-type: none"> <li>• Faulty driver's door actuator.</li> <li>• Poor ground (※2).</li> <li>• An open in the wire.</li> </ul>
8 ※1	RED/WHT and BLK/RED	Connect the WHT/YEL terminal to the RED/WHT terminal, and the BLK/RED terminal to the BLK terminal momentarily.	Check door lock operation: Driver's door should lock as the wires are connected momentarily.	<ul style="list-style-type: none"> <li>• Faulty driver's door actuator.</li> <li>• An open in the wire.</li> </ul>
		Connect the WHT/YEL terminal to the BLK/RED terminal, and the RED/WHT terminal to the BLK terminal momentarily.	Check door lock operation: Driver's door should unlock as the wires are connected momentarily.	
9	WHT/RED <sup>2</sup> and YEL/RED	Connect the WHT/YEL terminal to the WHT/RED <sup>2</sup> terminal, and the YEL/RED terminal to the BLK terminal momentarily.	Check door lock operation: Passenger doors should lock as the wires are connected momentarily.	<Sedan> <ul style="list-style-type: none"> <li>• Faulty passenger's door actuator.</li> <li>• An open in the wire.</li> </ul>
		Connect the WHT/YEL terminal to the YEL/RED terminal, and the WHT/RED <sup>2</sup> terminal to the BLK terminal momentarily.	Check door lock operation: Passenger doors should unlock as the wires are connected momentarily.	<Hachback> <ul style="list-style-type: none"> <li>• Faulty driver's door actuator.</li> <li>• Faulty passenger's door actuator.</li> <li>• An open in the wire.</li> </ul>

**CAUTION:** To prevent damage to the motor, connect power and ground only momentarily.

※1: Sedan

※2: G501, G502 (Hatchback)  
G551, G552 (Sedan)

< >: Hatchback

# Power Door Locks

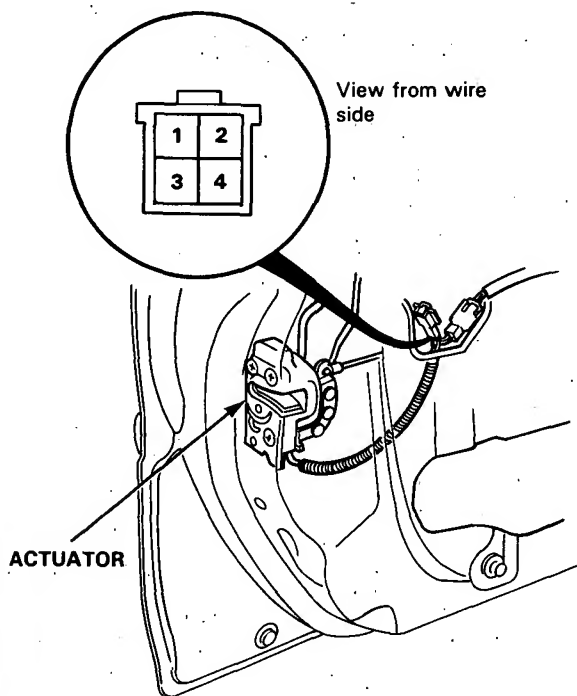
## Driver's Door Actuator Test

1. Remove the door panel.
2. Disconnect the actuator 4-P connector.
3. Test actuator operation:

**LOCK:** With battery power connected to the No. 2 terminal, connect ground to the No. 1 terminal momentarily.

**UNLOCK:** With battery power connected to the No. 1 terminal, connect ground to the No. 2 terminal momentarily.

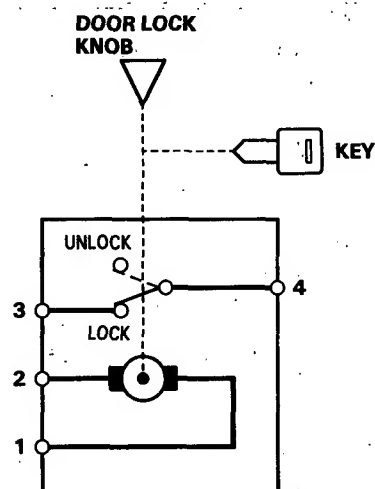
**CAUTION:** To prevent damage to the motor, connect power and ground only momentarily.



4. If the actuator fails to operate properly, replace it.

5. Check for continuity between the terminals in each switch position according to the table:

Terminal	3	4
Position		
LOCK		
UNLOCK		





## Passenger Door Actuator Test

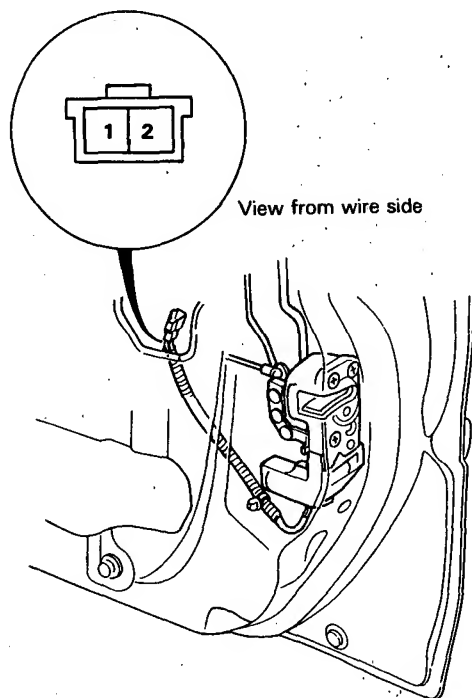
1. Remove the door panel.
2. Disconnect the actuator 2-P connector.
3. Test actuator operation:

**LOCK:** With battery power connected to the No. 1 terminal, connect ground to the No. 2 terminal momentarily.

**UNLOCK:** With battery power connected to the No. 2 terminal, connect ground to the No. 1 terminal momentarily.

**CAUTION:** To prevent damage to the motor, connect power and ground only momentarily.

**NOTE:** Right front actuator is shown; rear actuators are similar.

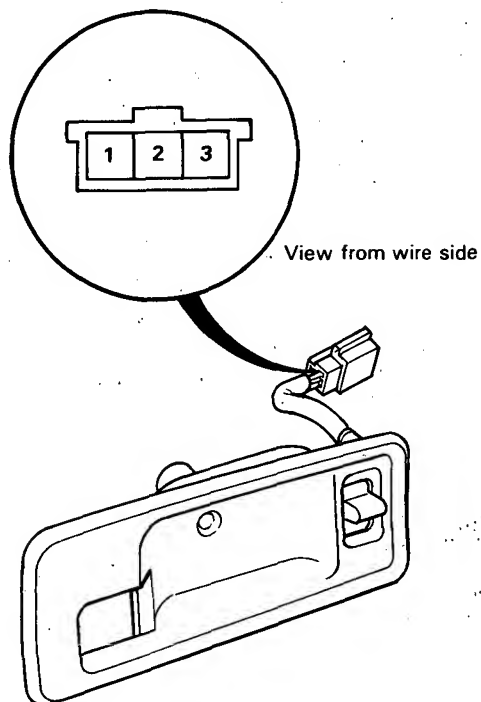


4. If the actuator fails to operate properly, replace it.

## Door Lock Switch Test

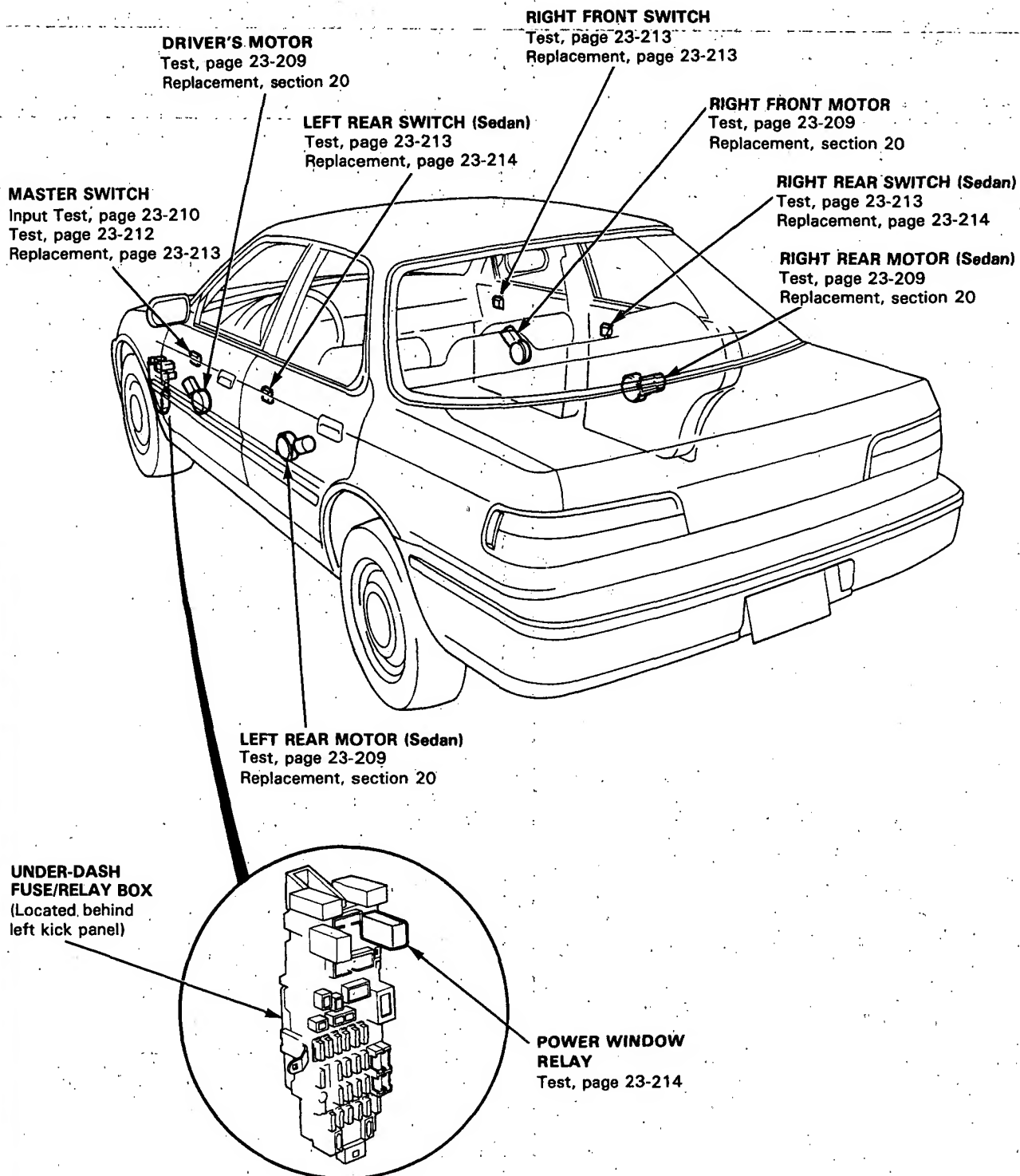
1. Remove the inside handle trim plate with the switch.
2. Disconnect the switch 3-P connector.
3. Check for continuity between the terminals in each switch position according to the tables.

Terminal Position	1	2	3
UNLOCK		○	○
OFF			
LOCK	○	○	



# Power Windows

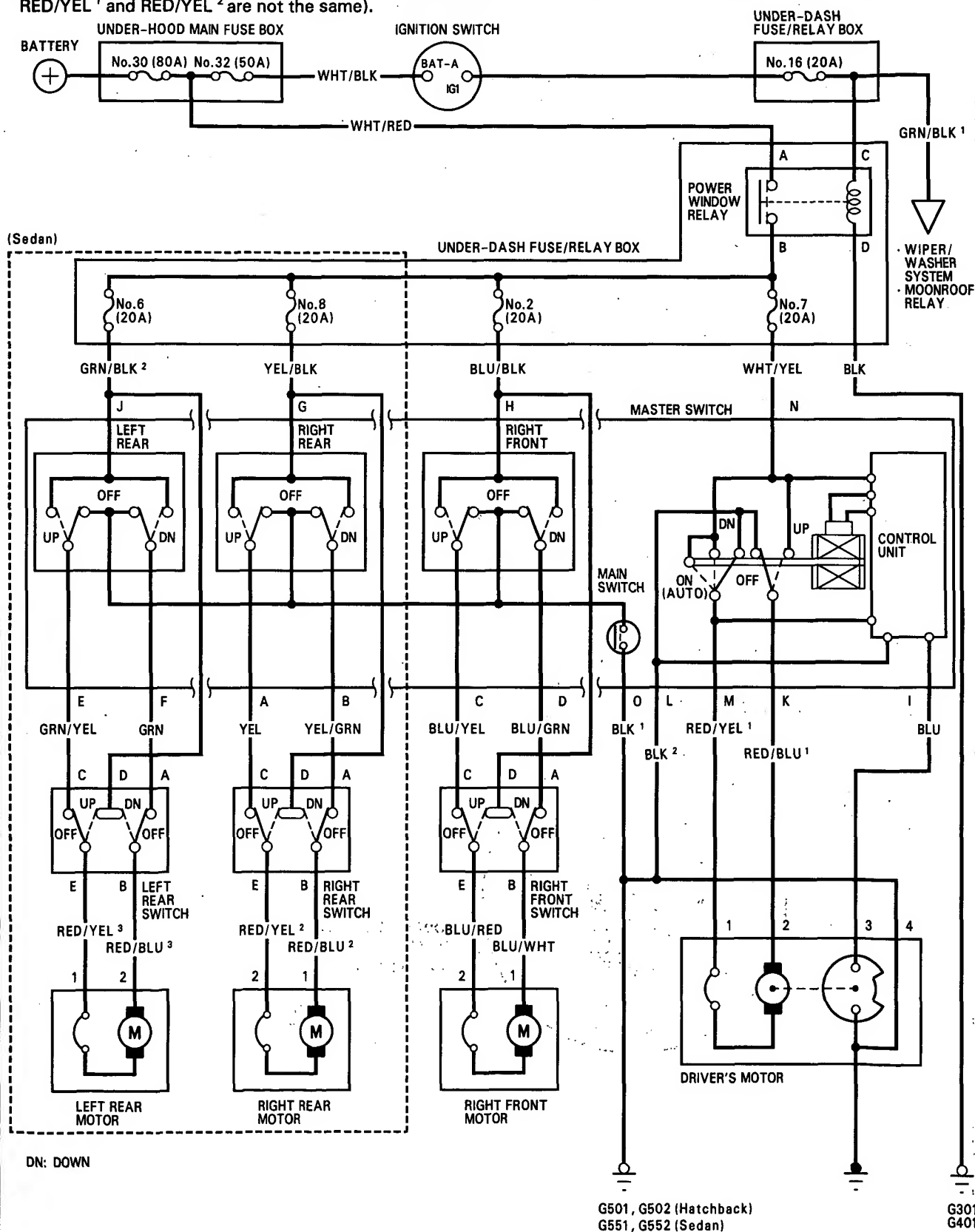
## Component Location Index





## Circuit Diagram

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, RED/YEL<sup>1</sup> and RED/YEL<sup>2</sup> are not the same).



# Power Windows

## Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence.

Symptom \ Item to be inspected		Blown No. 16 (20A) fuse (in the under-dash fuse/relay box)		Power window relay				In the under-dash fuse/relay box																					
				Blown No. 7 (20A) fuse		Blown No. 2 (20A) fuse		Blown No. 8 (20A) fuse		Blown No. 6 (20A) fuse		Driver's switch		Passenger's switch		Driver's motor		Pulser (in driver's motor)		Passenger's motor		Window regulator		Master switch input		Poor ground		Open circuit, loose or disconnected terminals	
All windows do not operate.		1	2																			*				WHT/RED, GRN/BLK <sup>1</sup>			
Driver's window does not operate.				1									2						3	4						WHT/YEL			
Driver's window does not operate in AUTO.									1						2					3						BLU			
Passenger's windows do not operate.	Right front				1			2	3								4	5								BLU/BLK			
	Left rear						1	2	3								4	5								GRN/BLK <sup>2</sup>			
	Right rear					1		2	3									4	5							YEL/BLK			

\* : G301, G401  
G501, G502 (Hatchback)  
G551, G552 (Sedan)

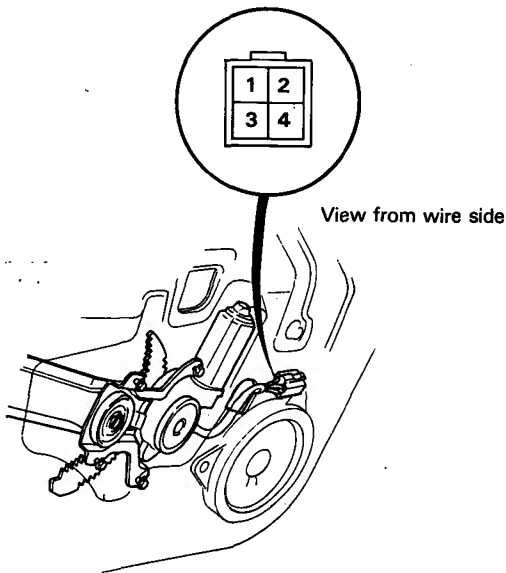




## Driver's Motor Test

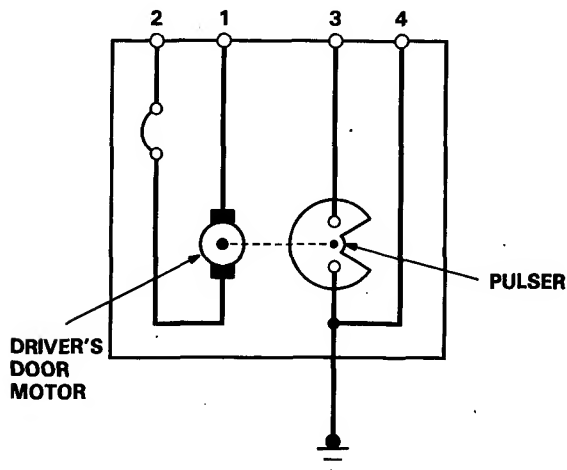
### Motor Test:

1. Remove the door panel (see section 20).
2. Disconnect the 4-P connector from the door wire harness.
3. Test the motor by connecting battery power and ground to the No. 1 and No. 2 terminals. Test the motor in each direction by switching the leads.
4. If the motor does not run, replace it.



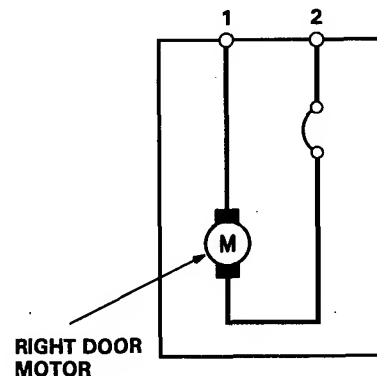
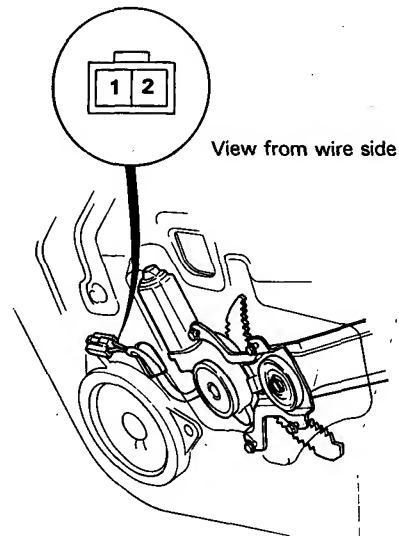
### Pulser Test:

Measure resistance between the No.3 and No.4 terminals when running the motor by connecting battery power and ground the No. 1 and No. 2 terminals. The ohmmeter should indicate between 20-50 ohms as the motor runs.



## Passenger's Motor Test

1. Remove the door panel (see section 20).
2. Disconnect the 2-P connector from the motor.
3. Test motor operation by connecting battery power and ground to the No. 1 and No. 2 terminals. Test the motor in each direction by switching the leads.
4. If the motor does not run, replace it.



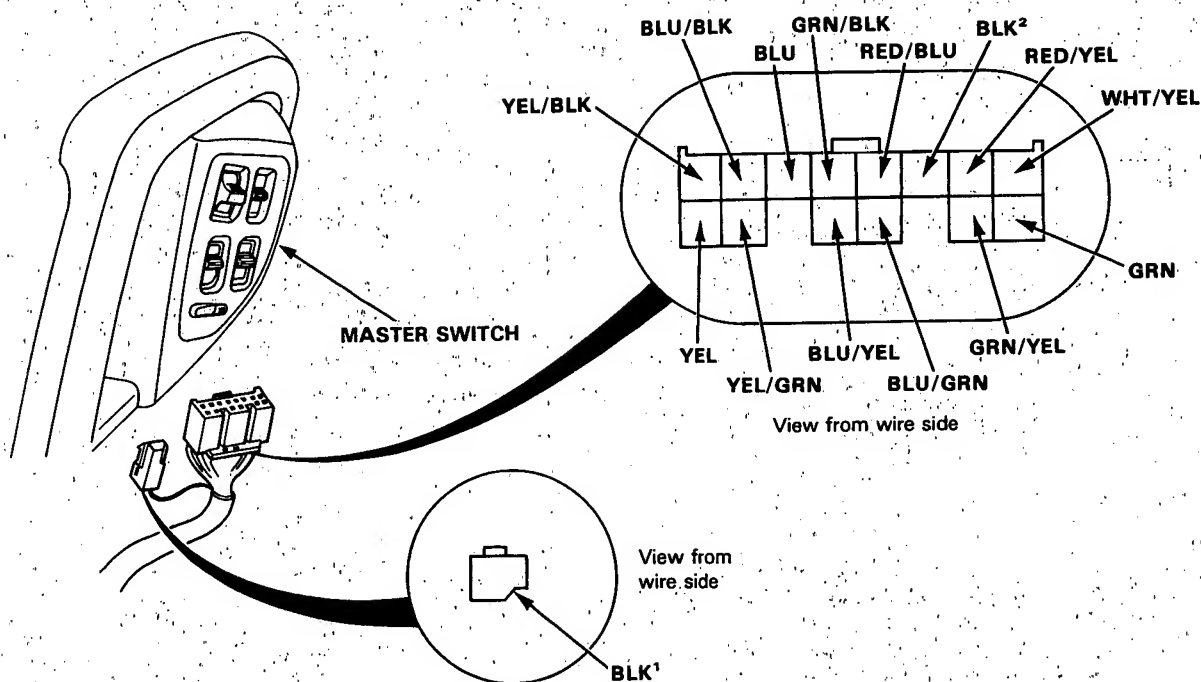
# Power Windows

## Master Switch Input Test

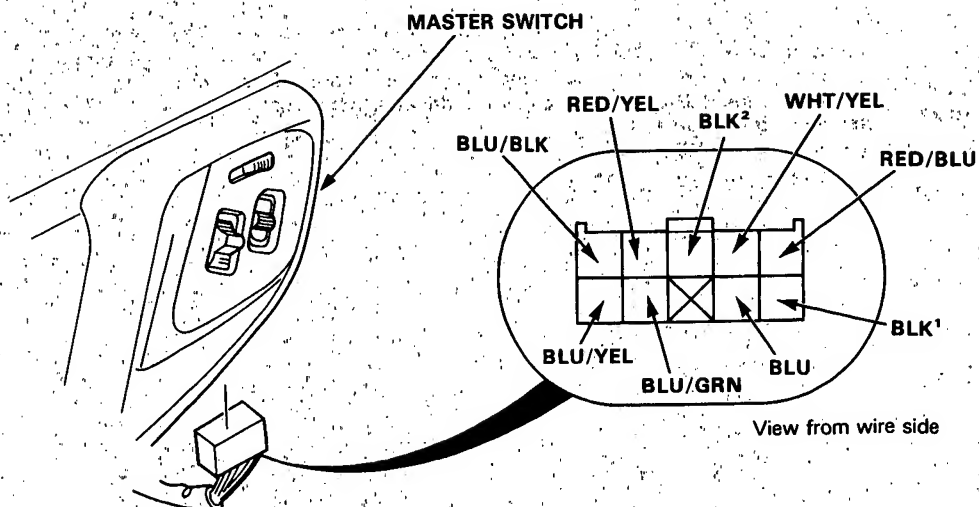
NOTE: The control unit is built into the master switch, and only controls the driver's door window operation.

1. Remove the driver's door panel, then disconnect the 14-P and 1-P connectors (Sedan), or 10-P connector (Hatchback) from the master switch.
2. Inspect the connector and socket terminals to be sure they are all making good contact.
  - If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
  - If the terminals look OK, make the following input tests at the connectors.
    - If any test indicates a problem, find and correct the cause, then recheck the system.
    - If all input tests prove OK, the master switch must be faulty; replace it.

Sedan:



Hatchback:





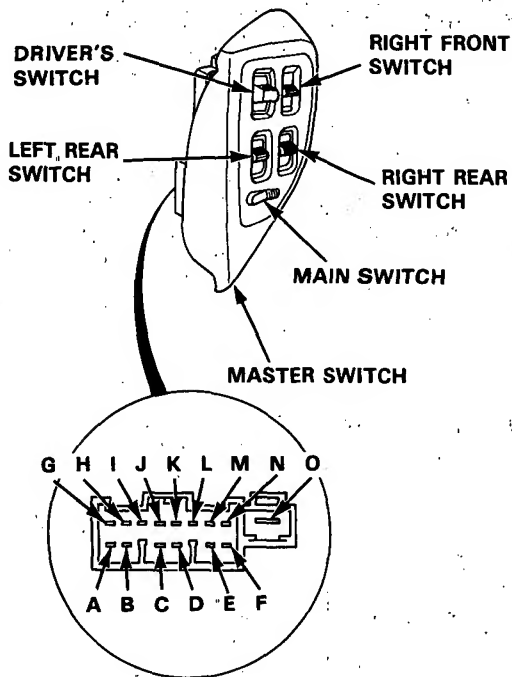
No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK <sup>1</sup>	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground G501, G502 (Hatch-back) or G551, G552 (Sedan).</li> <li>• An open in the wire.</li> </ul>
2	WHT/YEL	Ignition switch is ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No.2, 6, 7 or 8 (20A) fuse.</li> <li>• Faulty power window relay.</li> <li>• An open in the wire.</li> </ul>
	BLU/BLK			
	YEL/BLK			
	GRN/BLK			
3	RED/BLU and RED/YEL	Connect the WHT/YEL terminal to the RED/BLU terminal, and the RED/YEL terminal to the BLK terminal, then turn the ignition switch ON.	Check the driver's motor operation: It should run.	<ul style="list-style-type: none"> <li>• Faulty driver's motor.</li> <li>• An open in the wire.</li> </ul>
4	BLU/YEL and BLU/GRN	Connect the BLU/BLK terminal to the BLU/YEL terminal, and the BLU/GRN terminal to the BLK terminal, then turn the ignition switch ON.	Check the right front motor operation: It should run.	<ul style="list-style-type: none"> <li>• Faulty right front motor.</li> <li>• Faulty right front switch.</li> <li>• An open in the wire.</li> </ul>
5	YEL and YEL/GRN	Connect the YEL/BLK terminal to the YEL terminal, and the YEL/GRN terminal to the BLK terminal, then turn the ignition switch ON.	Check the right rear motor operation: It should run.	<ul style="list-style-type: none"> <li>• Faulty right rear motor.</li> <li>• Faulty right rear switch.</li> <li>• An open in the wire.</li> </ul>
6	GRN/YEL and GRN	Connect the GRN/BLK terminal to the GRN/YEL terminal, and the GRN terminal to the BLK terminal, then turn the ignition switch ON.	Check the left rear motor operation: It should run.	<ul style="list-style-type: none"> <li>• Faulty left rear motor.</li> <li>• Faulty left rear switch.</li> <li>• An open in the wire.</li> </ul>
7	BLU and BLK <sup>2</sup>	Connect the WHT/YEL terminal to the RED/YEL terminal, and the BLK terminal to the RED/BLU terminal, then turn the ignition switch ON.	Check for resistance between the BLU and BLK terminals: Between 20—50 ohms should be indicated as the driver's motor runs.	<ul style="list-style-type: none"> <li>• Faulty pulser.</li> <li>• Faulty driver's motor.</li> <li>• An open in the wire.</li> </ul>

# Power Windows

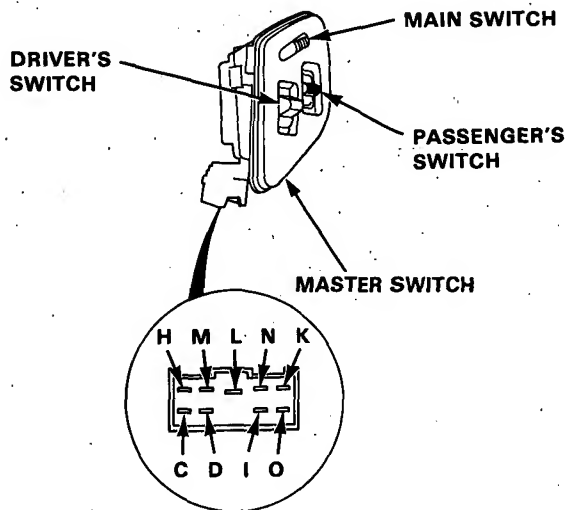
## Master Switch Test

1. Remove the door panel (see section 20).
2. Check for continuity between the terminals in each switch position according to the tables.

**Sedan:**



**Hatchback:**



### Driver's Switch

Terminal	N	L	M	K
Position				
OFF		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UP	<input type="radio"/>			<input type="radio"/>
DOWN	<input type="radio"/>		<input type="radio"/>	
DOWN (AUTO)	<input type="radio"/>		<input type="radio"/>	

### Right Front Switch (Passenger's Switch)

Terminal	H	C	D	O
Position	Main switch			
OFF	ON	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	OFF	<input type="radio"/>	<input type="radio"/>	
UP	ON	<input type="radio"/>		
	OFF	<input type="radio"/>		
DOWN	ON	<input type="radio"/>	<input type="radio"/>	
	OFF	<input type="radio"/>	<input type="radio"/>	

### Left Rear Switch (Sedan)

Terminal	G	A	B	O
Position	Main switch			
OFF	ON	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	OFF	<input type="radio"/>	<input type="radio"/>	
UP	ON	<input type="radio"/>		
	OFF	<input type="radio"/>		
DOWN	ON	<input type="radio"/>	<input type="radio"/>	
	OFF	<input type="radio"/>	<input type="radio"/>	

### Right Rear Switch (Sedan)

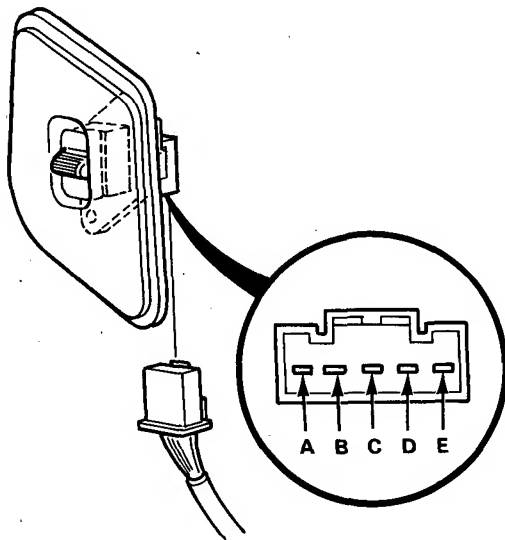
Terminal	J	F	E	O
Position	Main switch			
OFF	ON	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	OFF	<input type="radio"/>	<input type="radio"/>	
UP	ON	<input type="radio"/>	<input type="radio"/>	
	OFF	<input type="radio"/>	<input type="radio"/>	
DOWN	ON	<input type="radio"/>	<input type="radio"/>	
	OFF	<input type="radio"/>	<input type="radio"/>	



## Passenger's Switch Test

1. Remove the door panel, then disconnect the 5-P connector.
2. Check for continuity between the terminals in each switch position according to the table.

NOTE: Right front switch is shown, rear switches are similar.

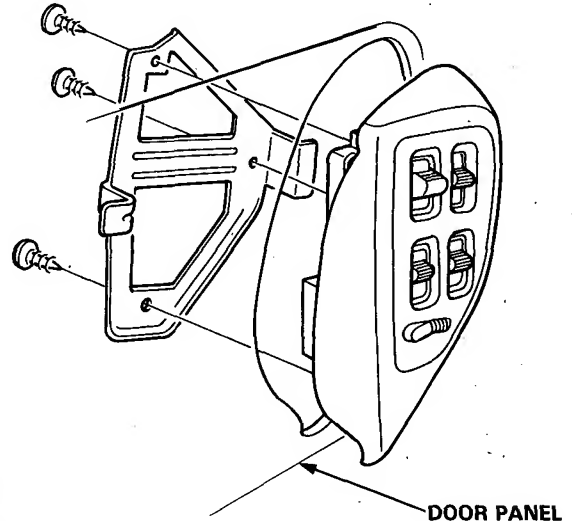


Terminal Position	A	B	C	D	E
UP	○—○			○—○	
OFF	○—○	○—○	○—○	○—○	○—○
DOWN		○—○		○—○	○—○

## Switch Replacement

### Master Switch:

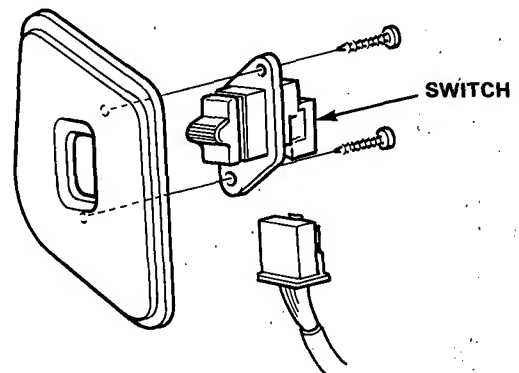
1. Remove the door panel, then disconnect the 14-P and 1-P connectors (Sedan) or 10-P connector (Hatchback).
2. Remove the switch from the door panel by removing the three mounting screws.



### Right Front Switch:

1. Remove the door panel, then disconnect the 5-P connector.
2. Remove the switch from the switch assembly by removing the two mounting screws.

NOTE: Right front switch of the hatchback is shown, sedan is similar.



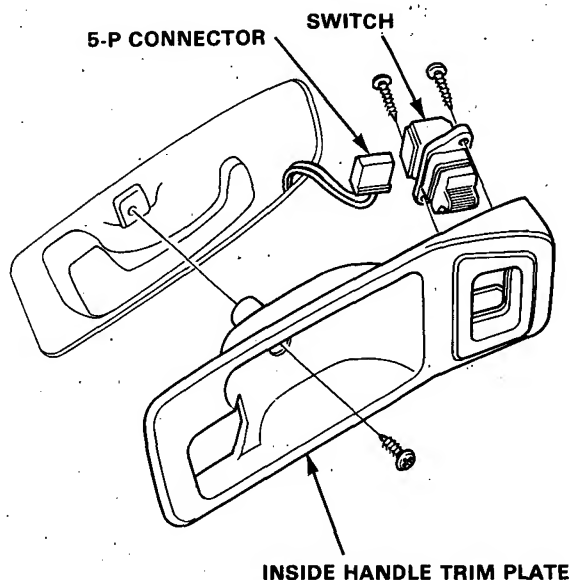
(cont'd)

# Power Windows

## Switch Replacement (cont'd)

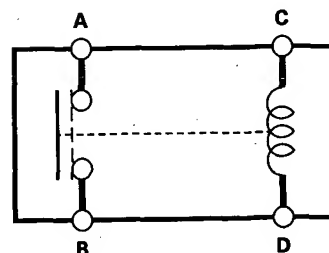
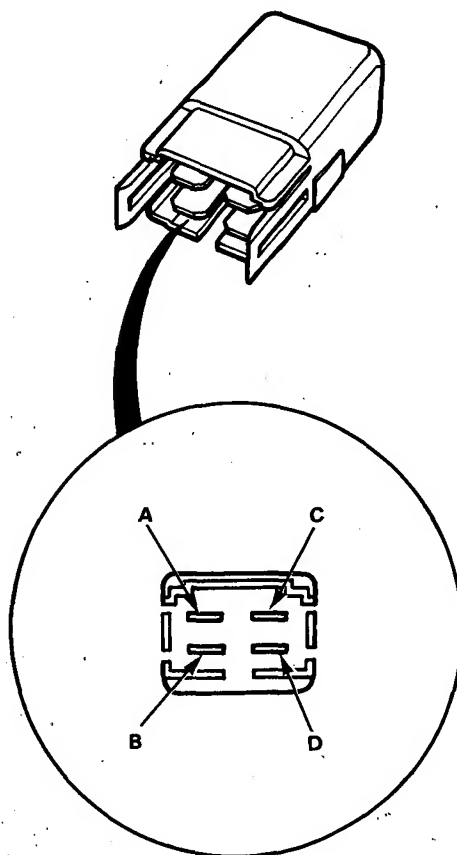
### Rear Switches:

1. Remove the screw and the inside handle trim plate.
2. Remove the two screws and the switch, then disconnect the 5-P connector.



## Relay Test

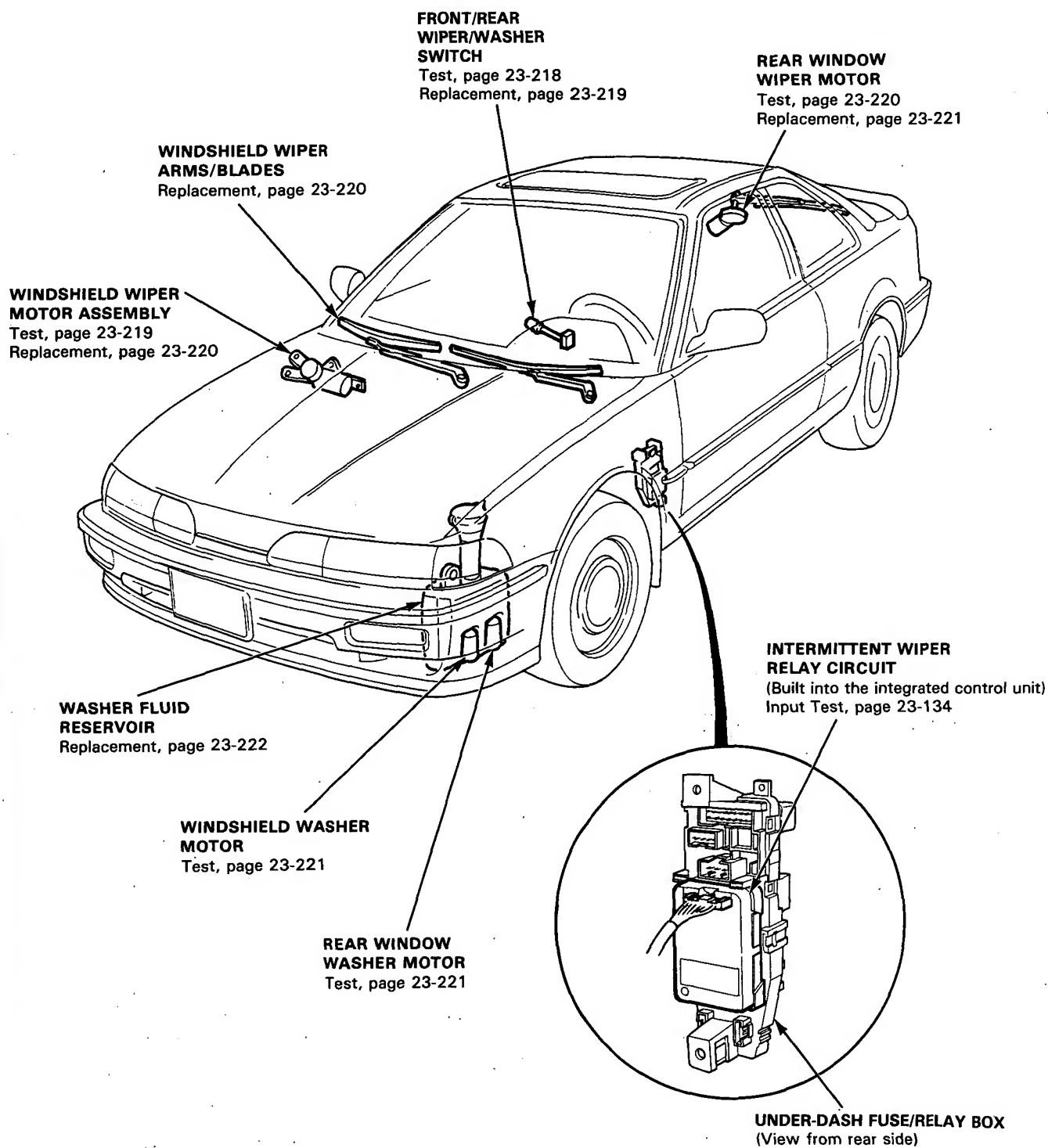
1. Remove the relay from the under-dash fuse/relay box.
2. There should be continuity between the C and D terminals.
3. There should be continuity between the A and B terminals when battery power and ground are connected to the C and D terminals. There should be no continuity when power is disconnected.



# Wipers/Washers



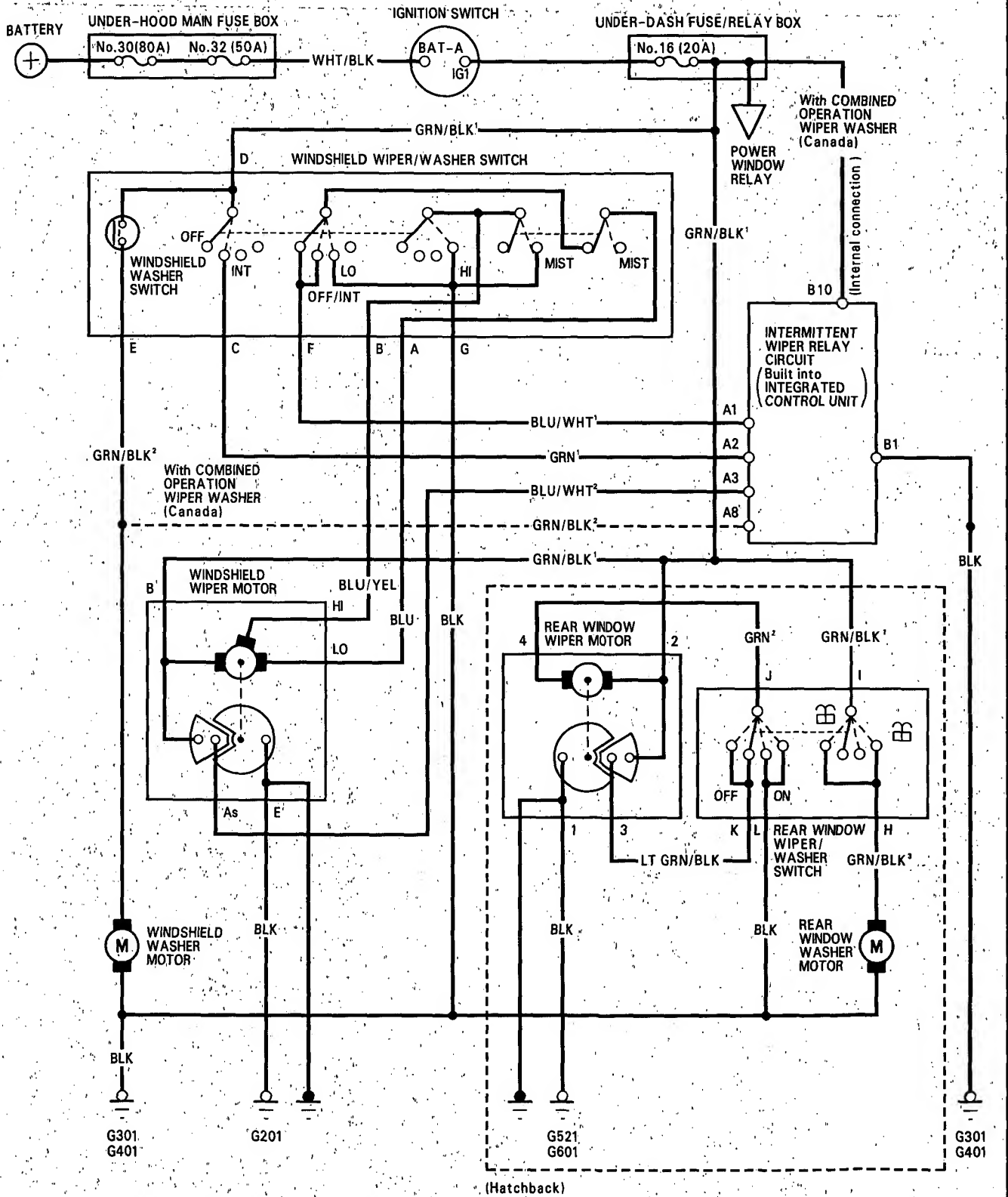
## Component Location Index



# Wipers/Washers

## Circuit Diagram

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, GRN/BLK<sup>1</sup> and GRN/BLK<sup>2</sup> are not the same).







## Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence.

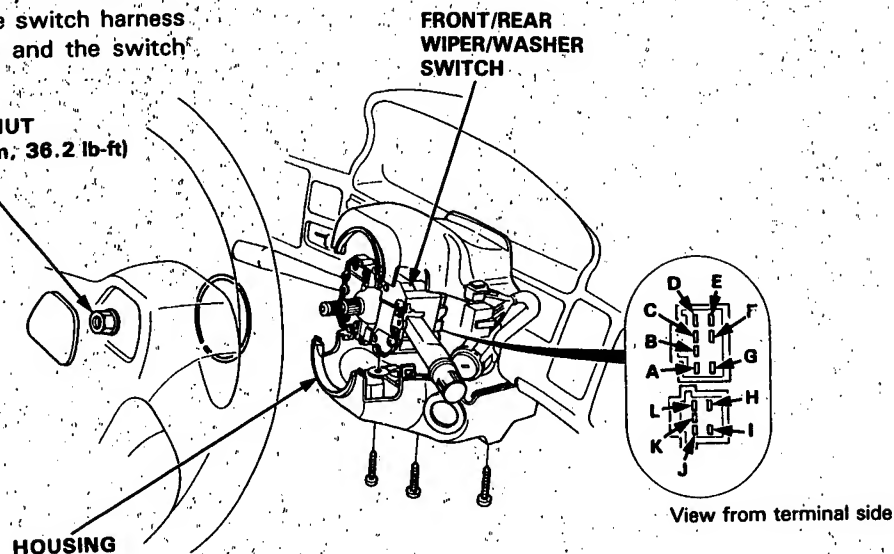
Item to be inspected		Blown No.16 (20A) fuse (In the under-dash fuse/relay box)	Wiper switch	Wiper motor assembly	Washer switch	Washer motor	Intermittent wiper relay circuit (In the integrated control unit)	Insufficient washer fluid in reservoir	Disconnected, blocked washer hose or clogged outlet	Disconnected wiper linkages	Poor ground	Open circuit in wires, loose or disconnected terminals
Wipers do not operate.	In all positions	1	4	2						3	G201	GRN/BLK <sup>1</sup>
	In INT		1				2					GRN <sup>1</sup> , BLU/WHT <sup>1</sup>
	In LO or HI		1									
	In Mist		1									
Rear window wiper does not operate.		1	3	2							G521, G601	GRN/BLK <sup>1</sup> , GRN <sup>2</sup>
Blades do not return to park position when wipers are turned OFF.			2	1								BLU/WHT <sup>2</sup>
Erratic intermittent cycle or wipers do not operate intermittently.			1				2					GRN <sup>1</sup> , BLU/WHT <sup>1</sup> , BLU/WHT <sup>2</sup>
Little or no washer fluid is pumped.					4	3		1	2		G301, 401	GRN/BLK <sup>2</sup> , GRN/BLK <sup>3</sup>

# Wipers/Washers

## Front/Rear Wiper/Washer Switch Test

1. Remove the steering wheel and the steering column covers.
2. Disconnect the 8-P and 6-P connectors from the switch.
3. Check for continuity between the terminals in each switch position according to the table.
4. If all the tests prove OK, but the system does not work, check for continuity of the switch harness (between the main wire harness and the switch assembly).

**SELF-LOCKING NUT**  
50 N·m (5.0 kg-m, 36.2 lb-ft)  
Replace.



### FRONT

Terminal Position	A	B	C	D	E	F	G
OFF	<input type="radio"/>					<input type="radio"/>	
INT	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>		<input type="radio"/>	
LO	<input type="radio"/>						<input type="radio"/>
HI		<input type="radio"/>					<input type="radio"/>
Mist Switch "ON"		<input type="radio"/>					<input type="radio"/>
Washer Switch "ON"				<input type="radio"/>	<input type="radio"/>		

### REAR

Terminal Position	H	I	J	K	L
Washer Switch "ON"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>
OFF			<input type="radio"/>	<input type="radio"/>	
ON			<input type="radio"/>		<input type="radio"/>
Washer Switch "ON"	<input type="radio"/>	<input type="radio"/>			



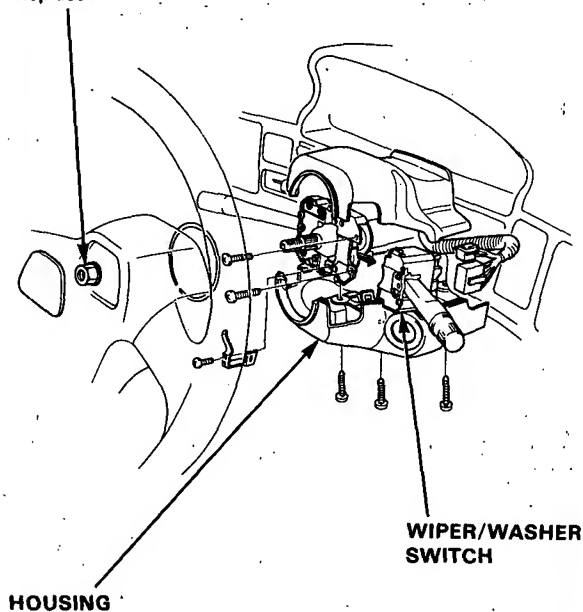
## Front/Rear Wiper/Washer Switch Replacement

1. Remove the steering wheel.
2. Remove the lower and upper covers from the steering column.
3. Disconnect the 8-P and 6-P connectors from the front/rear wiper/washer switch.
4. Remove the two screws and slide the front/rear wiper/washer switch out of the housing as shown.

### NOTE:

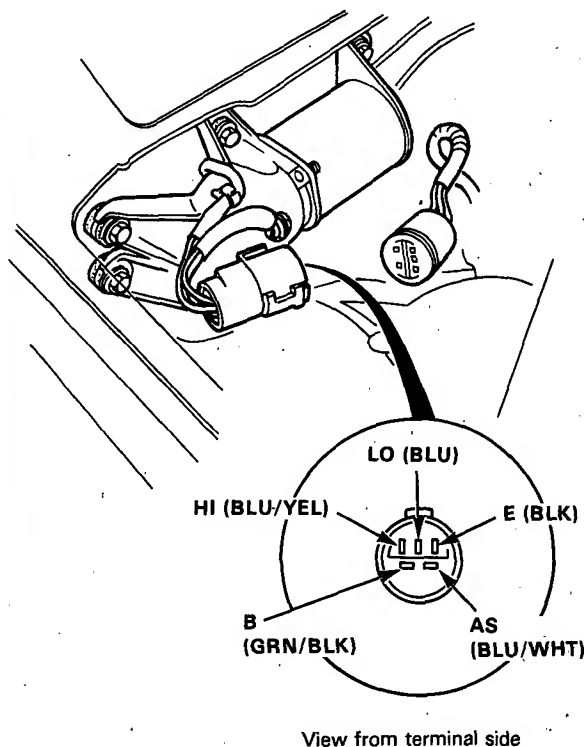
- Be careful not to damage the steering wheel cover.
- If equipped with cruise control, remove the front/rear wiper/washer switch after removing the slip ring (see page 23-231).

**SELF-LOCKING NUT**  
50 N·m (5.0 kg-m, 36.2 lb-ft)  
Replace.



## Windshield Wiper Motor Test

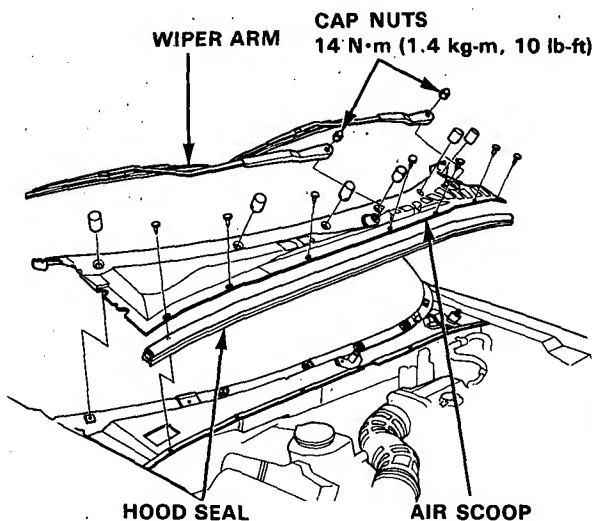
1. Disconnect the 5-P connector of the wiper motor assembly.
2. Test motor operation:  
**LOW SPEED:** Connect battery power to the B (GRN/BLK) terminal and ground to the Lo (BLU) terminal.  
**HIGH SPEED:** Connect battery power to the B (GRN/BLK) terminal and ground to the Hi (BLU/YEL) terminal.
3. If the motor fails to run smoothly, replace it.



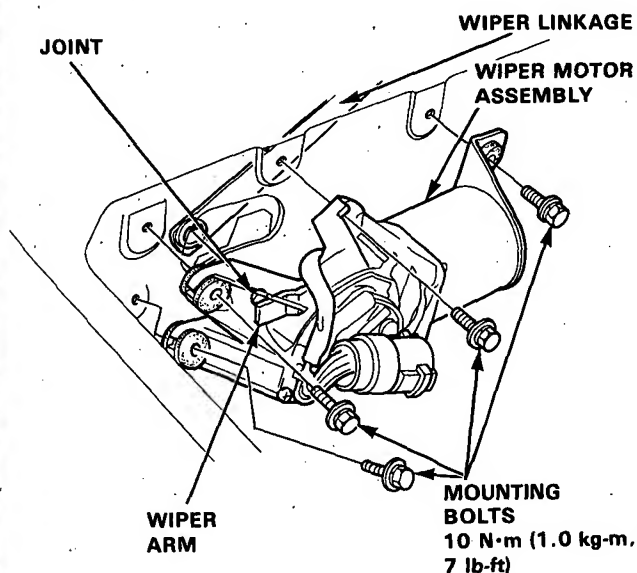
# Wipers/Washers

## Windshield Wiper Motor Replacement

1. Open the hood, remove the cap nuts, and carefully remove the wiper arms so they don't hit the hood.
2. Remove the hood seal and air scoop by prying out their trim clips and removing the screws.



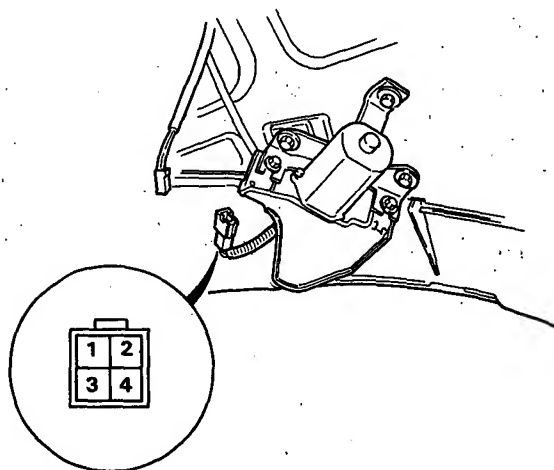
3. Pry the wiper linkage off the motor arm with a screw driver.
4. Disconnect the 5-P connector from the wiper motor assembly, then remove the four mounting bolts and the wiper motor assembly.



5. Install the wiper motor assembly in the reverse order of removal.

## Rear Window Wiper Motor Test

1. Remove the tailgate trim panel.
2. Disconnect the 4-P connector.
3. Test the wiper motor by connecting battery power to the No. 2 terminal and ground to the No. 4 terminal.
4. If the motor fails to run smoothly, replace it.



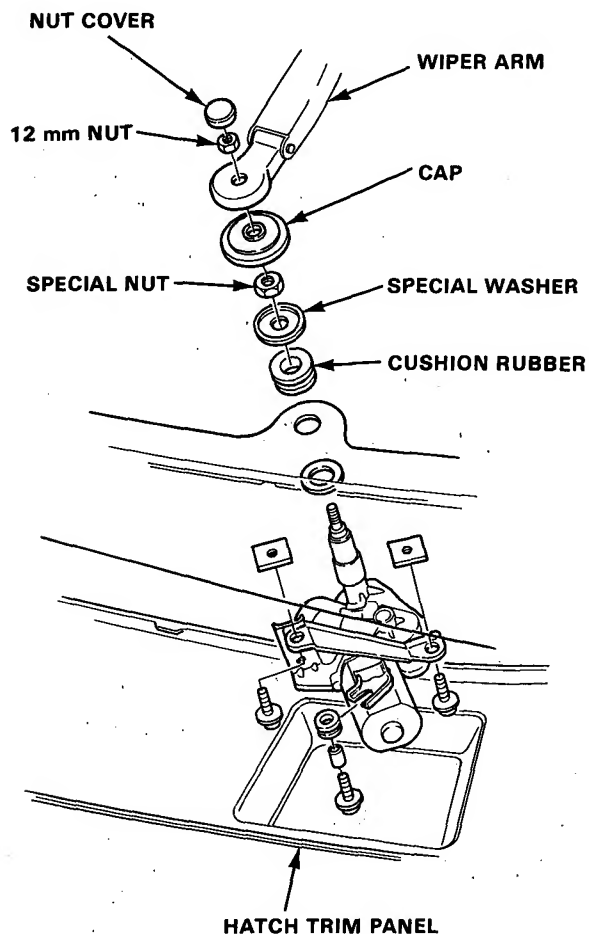
5. Check for continuity between the terminals according to the table.

Terminal	1	2	3
Wiper Blade			
At park position		○	○
At center position	○		○



## Rear Window Wiper Motor Replacement

1. Remove the tailgate trim panel.
2. Remove the nut cover, 12 mm nut, wiper arm, cap, special nut, special washer, and the cushion rubber.
3. Disconnect the 4-P connector from the wiper motor.
4. Remove the three mounting bolts and the wiper motor.

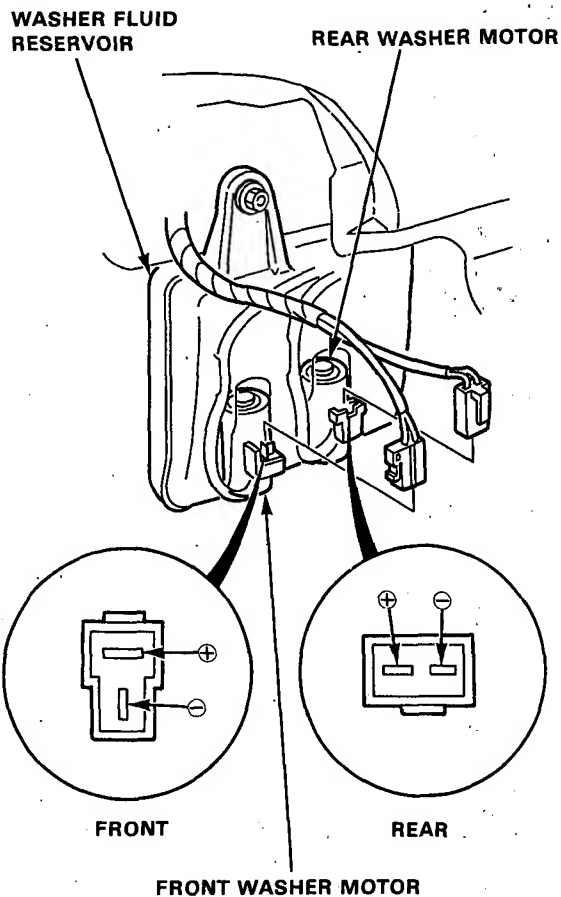


5. Install the wiper motor assembly in the reverse order of removal.

- Do not tighten the special nut too much.
- Check for water leakage in the rear wiper arm.

## Washer Motor Test

1. Remove the front bumper and disconnect the 2-P connector from the washer motor.
2. Test either washer motor operation by connecting battery power to the  $\oplus$  terminal and ground to the  $\ominus$  terminal.



- If the motor fails to run smoothly, replace it.
- If the motor runs smoothly but little or no washer fluid is pumped, check for disconnected or blocked washer hose, or a clogged pump outlet in the motor.

# Wipers/Washers

## Washer Replacement

1. Remove the bumper, then remove the washer reservoir by removing the three mounting bolts.
2. Disconnect the hose and the 2-P connectors from the front and rear washer motor.
3. Remove the washer nozzles by removing the screws.
4. When installing the washer system:
  - Clamp the hoses with the wire harness in the left front fender.
  - Take care not to pinch hoses during reinstallation.
  - Install the clips firmly.
5. After installing, adjust the washer nozzles.

WINDSHIELD  
WASHER  
NOZZLE

HOSE

REAR WINDOW  
WASHER NOZZLE

WASHER  
FLUID  
RESERVOIR

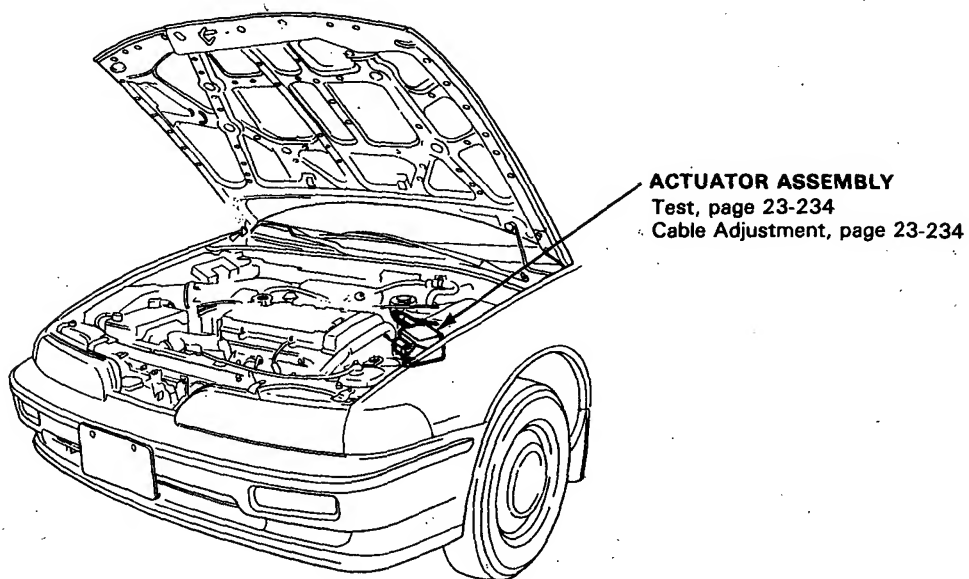
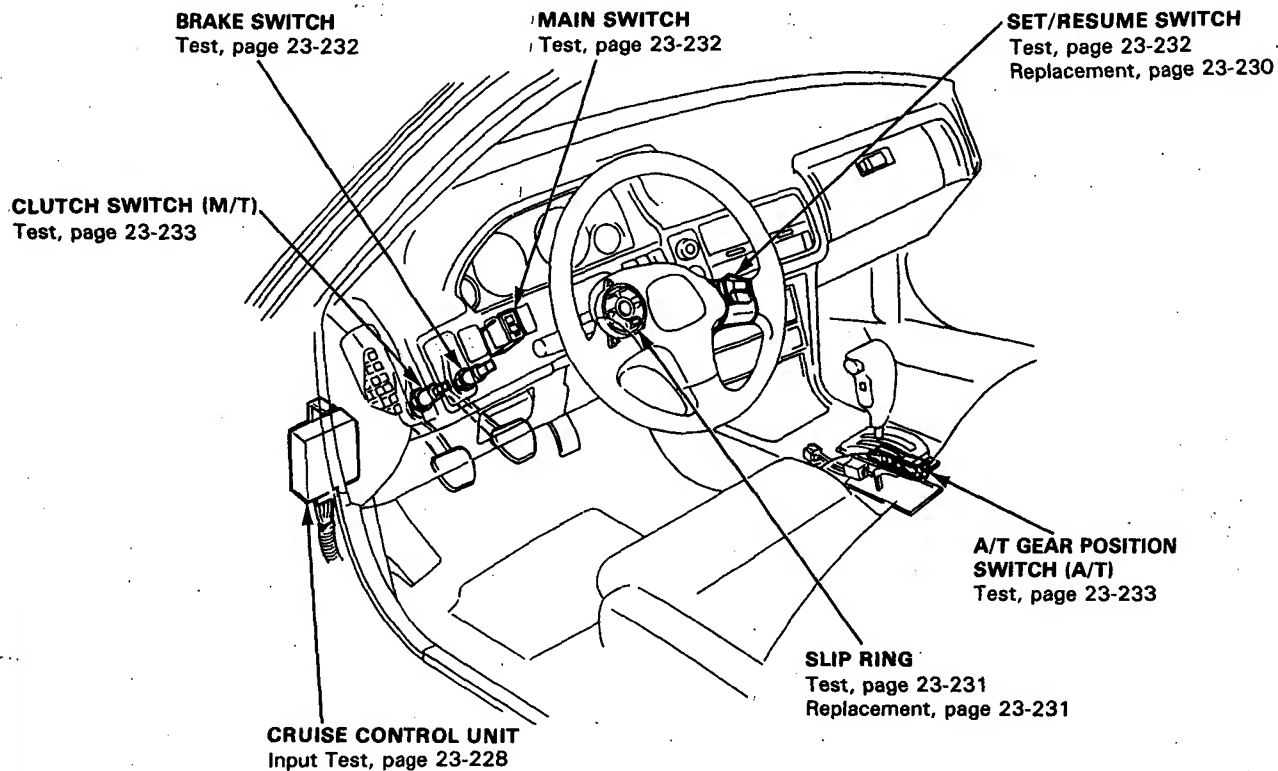
FRONT WASHER  
MOTOR

REAR WASHER  
MOTOR

MOUNTING  
BOLTS

# Cruise Control

## Component Location Index



# Cruise Control

## Description

The cruise control system uses mechanically and electrically operated devices to maintain vehicle speed at a setting selected by the driver:

The cruise control unit receives command signals from the cruise control main switch and the cruise control set/resume switch. It receives information about operating conditions from the brake switch, the distributor, vehicle speed sensor (VSS), the clutch switch (with manual transmission), or the A/T gear position switch (with automatic transmission). The cruise control unit sends operational signals to the devices that regulate the throttle position. The throttle position maintains the selected vehicle speed. Essentially, the control unit compares the actual speed of the vehicle to the selected speed. Then, the control unit uses the result of that comparison to open or close the throttle.

The brake switch releases the system's control of the throttle at the instant the driver depresses the brake pedal. The switch sends an electronic signal to the control unit when the brake pedal is depressed; the control unit responds by allowing the throttle to close. The clutch switch (manual transmission) or the A/T gear position switch (automatic transmission) sends a disengage signal input to the control unit that also allows the throttle to close.

## Operation

The cruise control system will set and automatically maintain any speed above 30 mph (45 km/h). To set, make sure that the main switch is in the "ON" position. After reaching the desired speed, press the set switch. The cruise control unit will receive a set signal input and, in turn, will actuate the cruise control actuator. When the set switch is depressed and the cruise control system is on, the "cruise control" on indicator on the warning display will light up.

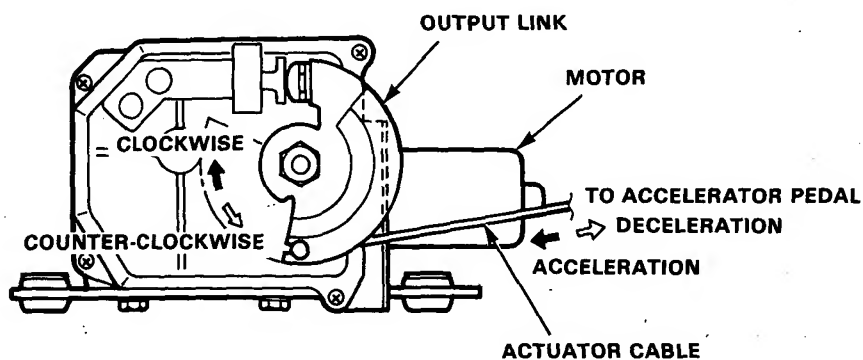
You can cancel the cruise control system by pushing the main switch to "OFF." This removes power to the control unit and erases the set speed from memory. If the system is disengaged temporarily by the brake switch, clutch switch, or A/T gear position switch and vehicle speed is still above 30 mph (45 km/h), press the resume switch. With the resume switch depressed and the set memory retained, the vehicle automatically returns to the previous set speed.

For gradual acceleration without depressing the accelerator pedal, push the resume switch down and hold it there until the desired speed is reached. This will send an acceleration signal input to the control unit. When the switch is released, the system will be reprogrammed for the new speed. To slow the vehicle down, depress the set switch. This will send a deceleration signal input to the control unit causing the vehicle to coast until the desired speed is reached. When the desired speed is reached, release the set switch. This will reprogram the system for the new speed.





The electrically operated actuator controls the throttle position in the same way as a vacuum operated actuator. The magnetic clutch is part of the safety system and controls acceleration or deceleration.

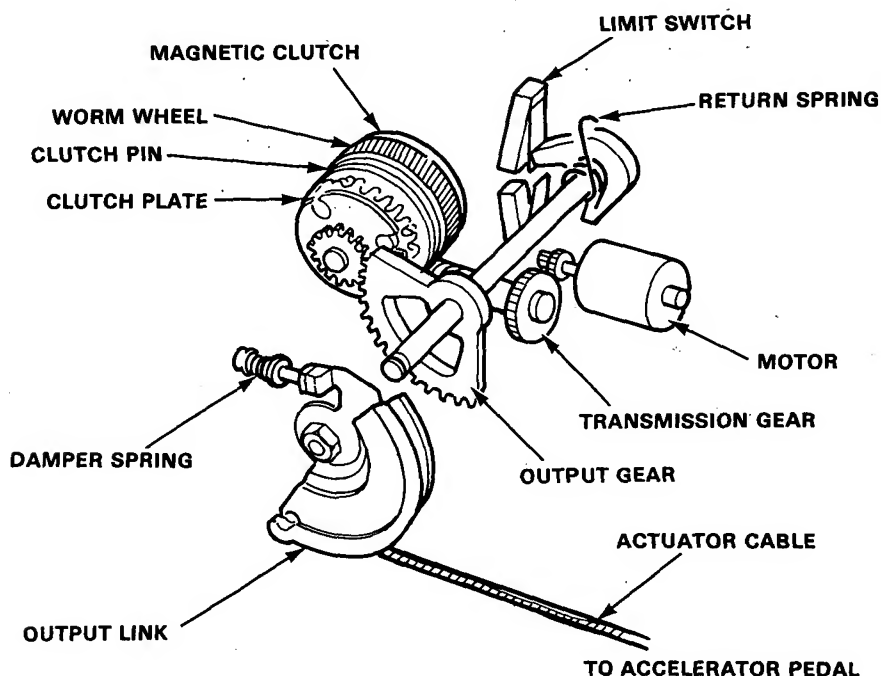


#### Acceleration

Due to the rotation of the motor output shaft, power is transmitted to the magnetic clutch by the transmission gear and the worm wheel. The magnetic clutch is rotated and magnetized. It attracts the clutch plate, and power is transmitted to the output link by the gear directly connected to the clutch plate and the output gear. The output link rotates clockwise, then the actuator cable opens the throttle, and the car accelerates.

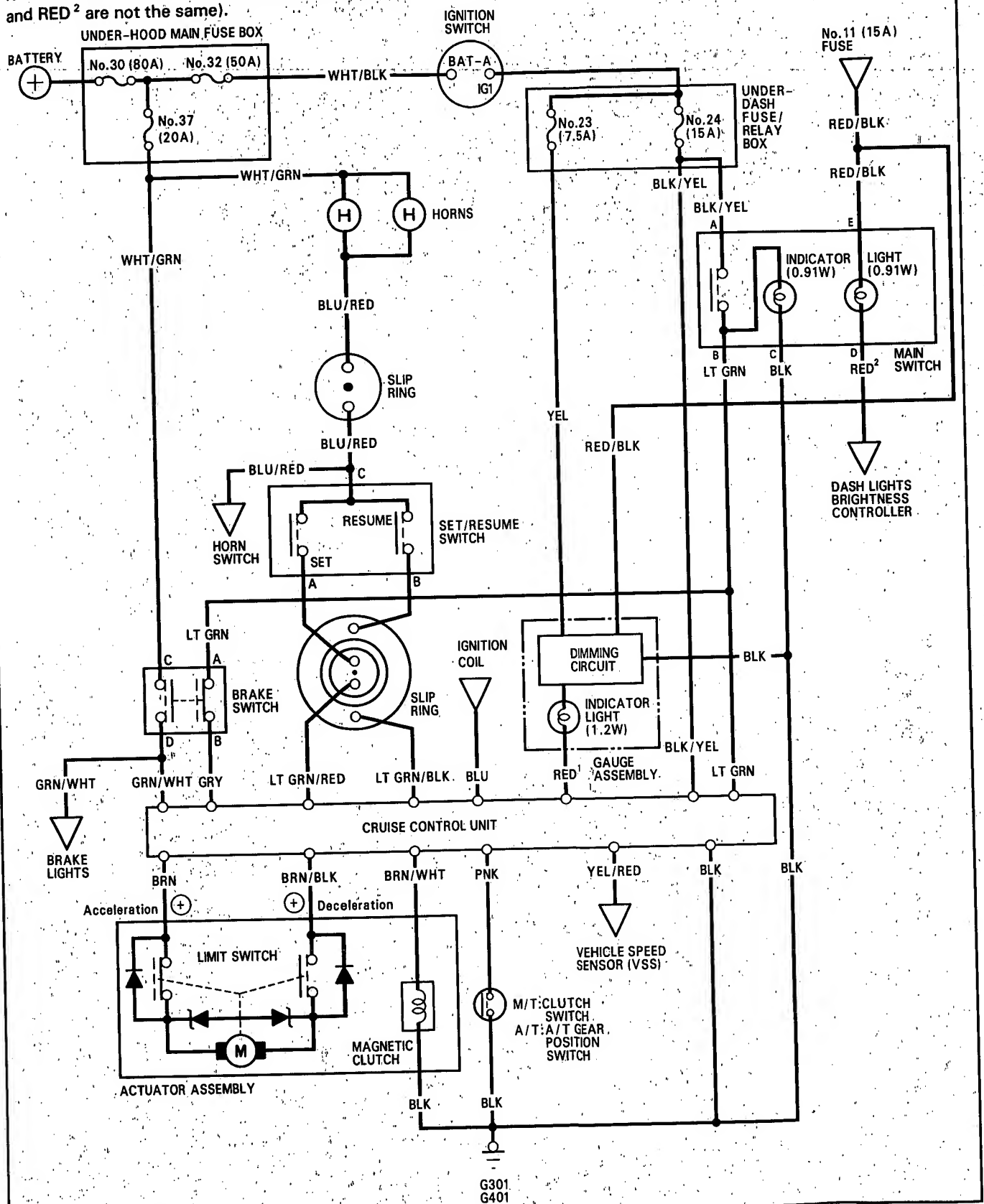
#### Deceleration

The motor output shaft rotates in the reverse direction of acceleration; then, in the same way, the power is transmitted to the output link. The output link rotates counterclockwise, then the actuator cable closes the throttle, and the car decelerates.



# Cruise Control Circuit Diagram

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, RED<sup>1</sup> and RED<sup>2</sup> are not the same).





## Troubleshooting

### NOTE:

- The numbers in the table show the troubleshooting sequence.
- Before troubleshooting.
  - Check the No. 23 (7.5 A) and No. 24 (15 A) fuses in the under-dash fuse/relay box, and the No. 30 (80 A), No. 32 (50 A), and No. 37 (20 A) fuses in the under-hood main fuse box.
  - Check that the horns sound.
  - Check the tachometer for proper operation.

Symptom	Items to be inspected.										Open circuit in wires, loose or disconnected terminals
	Main switch	SET/RESUME switch	Brake light switch/adjustment	Clutch switch/adjustment (M/T)	A/T gear position switch (A/T)	Vehicle speed sensor (VSS) or cable	Dimming circuit in gauges	Actuator and cable free play	Control unit input	Poor ground	
Cruise control can't be set.	1	2							3	G301, G401	BLK/YEL or LT GRN
Cruise control can be set, but indicator light does not go on.							1		2	G301, G401	YEL or RED <sup>1</sup>
Cruise speed noticeably higher or lower than what was set.						1		2	3		
Excessive overshooting and/or undershooting when trying to set speed.						2		1	3		
Steady speed not held even on a flat road with cruise control set.						1		2	3		
Car does not decelerate or accelerate accordingly when SET or RESUME button is pushed.		1							2		LT GRN/BLK LT GRN/RED
Set speed not canceled when clutch pedal is pushed (M/T).				1					2		
Set speed not canceled when shift lever is moved to <b>N</b> (A/T).					1				2		
Set speed not canceled when brake pedal is pushed.			1						2		
Set speed not canceled when main switch is pushed OFF.	1								2		
Set speed not resumed when RESUME button is pushed (with main switch on, but set speed temporarily canceled).		1							2		LT GRN/BLK LT GRN/RED

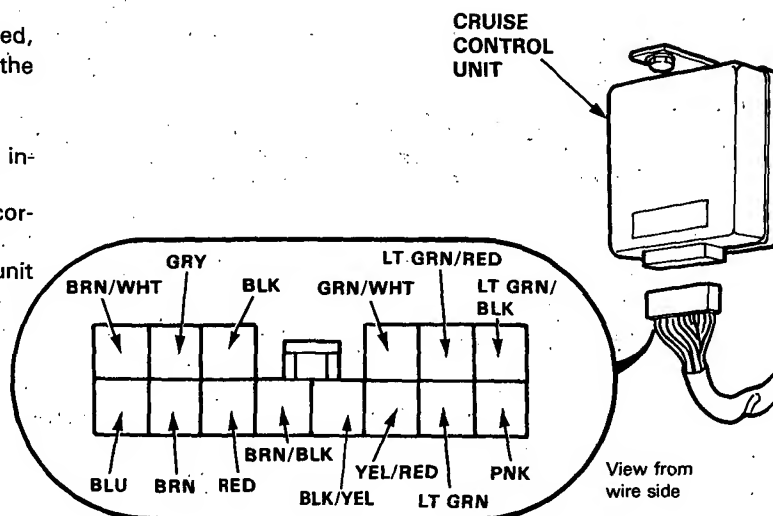
# Cruise Control

## Control Unit Input Test

1. Remove the dashboard lower cover and left knee bolster.

2. Disconnect the 14-P connector from the control unit. Inspect the connector and socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector.
  - If any test indicators a problem, find and correct the cause, then recheck the system.
  - If all the input tests prove OK, the control unit must be faulty; replace it.



No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401).</li> <li>• An open in the wire.</li> </ul>
2	BLK/YEL	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• An open in the wire.</li> <li>• Blown No. 24 (15 A) fuse.</li> </ul>
3	LT GRN	Ignition switch ON and main switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• An open in the wire.</li> <li>• Faulty main switch.</li> <li>• Blown No. 24 (15 A) fuse.</li> </ul>
4	LT GRN /BLK	Resume switch pushed.	Ground each terminal: Horns should sound as the switch is pushed.	<ul style="list-style-type: none"> <li>• An open in the wire.</li> <li>• Faulty SET/RESUME switch.</li> <li>• Faulty slip ring.</li> <li>• Faulty horn.</li> <li>• Blown No. 37 (20 A) fuse.</li> </ul>
5	LT GRN /RED	Set switch pushed.		
6	PNK	M/T: Clutch pedal not pushed. A/T: Shift lever in <span style="border: 1px solid black; padding: 0 2px;">2</span> , <span style="border: 1px solid black; padding: 0 2px;">S</span> or <span style="border: 1px solid black; padding: 0 2px;">D</span>	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (G301, G401)</li> <li>• An open in the wire.</li> <li>• Faulty or misadjusted clutch switch (M/T).</li> <li>• Faulty A/T gear position switch (A/T).</li> </ul>
7	BLU	Start the engine.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• An open in the wire.</li> <li>• Faulty ignition system.</li> </ul>
8	YEL/RED	Raise the front of the car and rotate one wheel  or remove the speedometer cable from the transmission and turn slowly by hand.	Check resistance in both directions between the YEL/RED and BLK terminals: There should be continuity in only one direction four times per cable revolution or 23 times per 10 wheel revolutions.	<ul style="list-style-type: none"> <li>• Faulty speed pulser in speedometer.</li> <li>• An open in the wire.</li> <li>• Poor ground (G301, G401).</li> </ul>



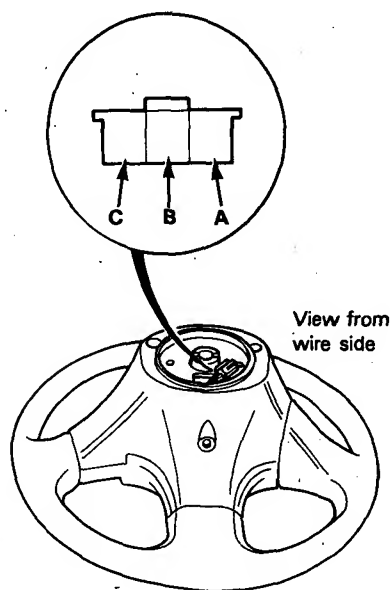
No.	Terminal	Test condition	Test: Desired result	Possible cause if result is not obtained
9	GRY	Ignition switch ON, main switch ON, and brake pedal pushed, then released.	Check for voltage to ground: There should be 0 V with the pedal pushed and battery voltage with the pedal released.	<ul style="list-style-type: none"><li>• An open in the GRY wire circuit.</li><li>• Faulty brake switch.</li></ul>
10	GRN/WHT	Brake pedal pushed, then released.	Check for voltage to ground: There should be battery voltage with the pedal pushed, and 0 V with the pedal released.	<ul style="list-style-type: none"><li>• An open in the GRN/WHT wire circuit.</li><li>• Blown No. 37 (20 A) fuse.</li><li>• Faulty brake switch.</li></ul>
11	RED	Ignition switch ON.	Attach RED terminals to ground: Indicator light in dash should come on.	<ul style="list-style-type: none"><li>• Blown bulb.</li><li>• An open in the RED wire circuit.</li><li>• Faulty dimming circuit in gauges.</li><li>• Blown No. 23 (7.5 A) fuse.</li></ul>
12	BRN	Connect battery power to the BRN terminal and ground to the BRN/BLK terminal.	Check the operation of the actuator motor: You should be able to hear the motor.	<ul style="list-style-type: none"><li>• Faulty actuator.</li><li>• An open in the wire.</li></ul>
13	BRN/BLK			
14	BRN/WHT	Connect battery power to the BRN/WHT terminal and ground to body ground.	Check the operation of the magnetic clutch: The clutch should click and the output link should be locked.	<ul style="list-style-type: none"><li>• Faulty actuator.</li><li>• An open in the wire.</li><li>• Poor ground (G301, G401).</li></ul>

# Cruise Control

## Set/Resume Switch Test

1. Remove the steering wheel.
2. Disconnect the 3-P connector.
3. Check for continuity between the terminals in each switch position according to the table.

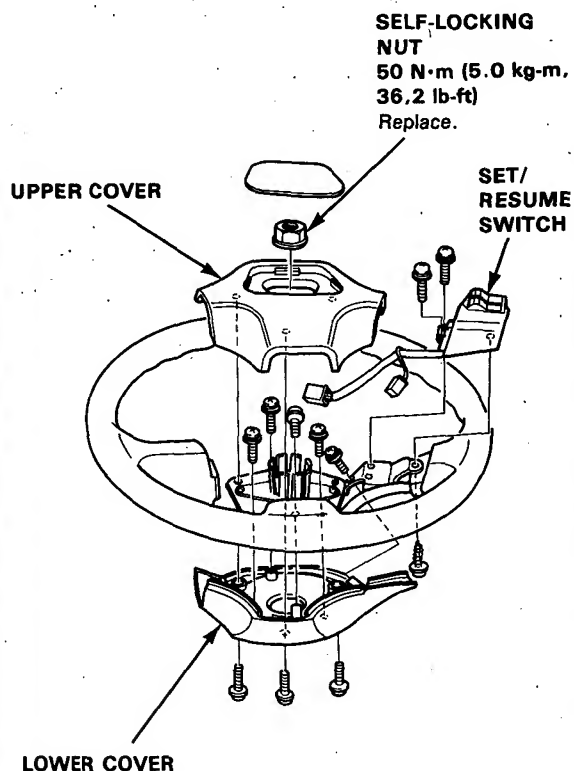
Terminal	A	B	C
Position			
OFF			
SET (ON)	○	—	○
RESUME (ON)		○	○



4. If there is no continuity, replace the switch.

## Set/Resume Switch Replacement

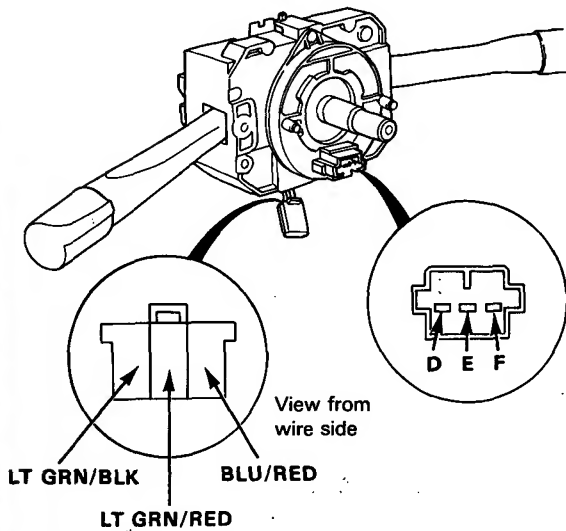
1. Remove the steering wheel.
2. Disconnect the 3-P connector.
3. Remove the wheel upper cover by removing the three screws and disconnect the 1-P connector.
4. Remove the wheel lower cover by removing the four screws.
5. Remove the three screws and the SET/RESUME switch from the steering wheel.





## Slip Ring Test

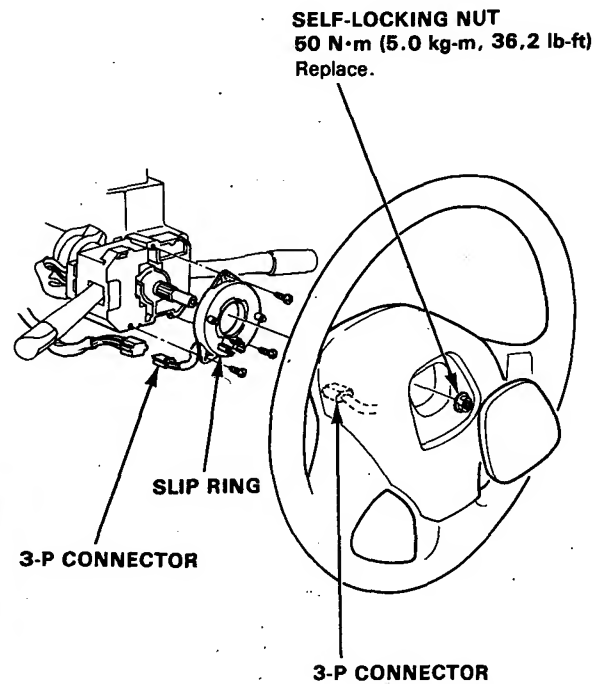
1. Remove the steering wheel.
2. Remove the column cover, then disconnect the 3-P connector from the main wire harness.
3. There should be continuity between the BLU/RED and D terminals, and the LT GRN/RED and E terminals, as you turn the slip ring.



4. If there is no continuity, replace the slip ring.

## Slip Ring Replacement

1. Remove the steering wheel.
2. Remove the column cover, then disconnect the 3-P connector from the main wire harness.
3. Remove the three screws and the slip ring.



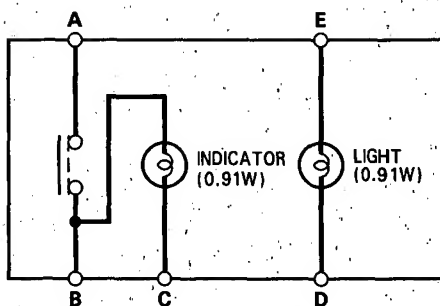
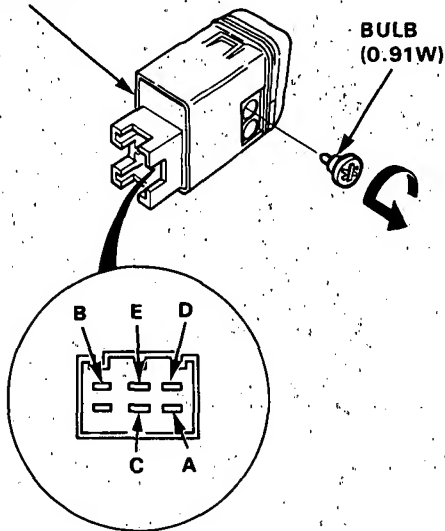
# Cruise Control

## Main Switch Test

1. Remove the switch from the instrument panel.
2. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	A	B	C	D	E
OFF		○	○	○	○
ON	○	○	○	○	○

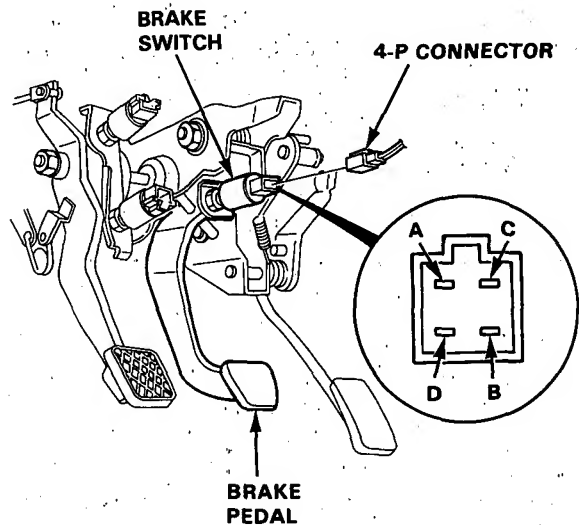
MAIN SWITCH



## Brake Switch Test

1. Disconnect the 4-P connector from the switch.
2. Check for continuity between the terminals according to the table.

Terminal Brake pedal	A	B	C	D
RELEASED	○	○		
PUSHED			○	○



3. If necessary, replace the switch or adjust pedal height (see section 12).

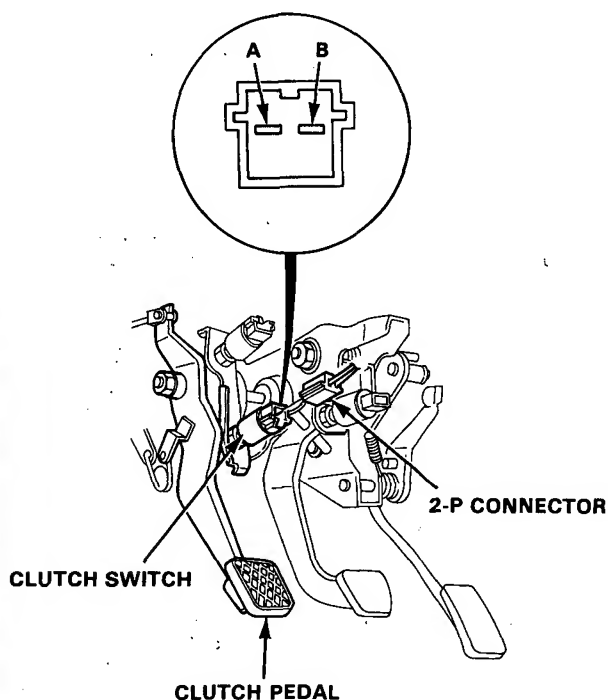




## Clutch Switch Test

1. Disconnect the 2-P connector from the switch.
2. Check for continuity between the terminals according to the table.

Terminal	A	B
Clutch pedal		
RELEASED	○	○
PUSHED		



3. If necessary, replace the switch or adjust pedal height (see section 12).

## A/T Gear Position Switch Test

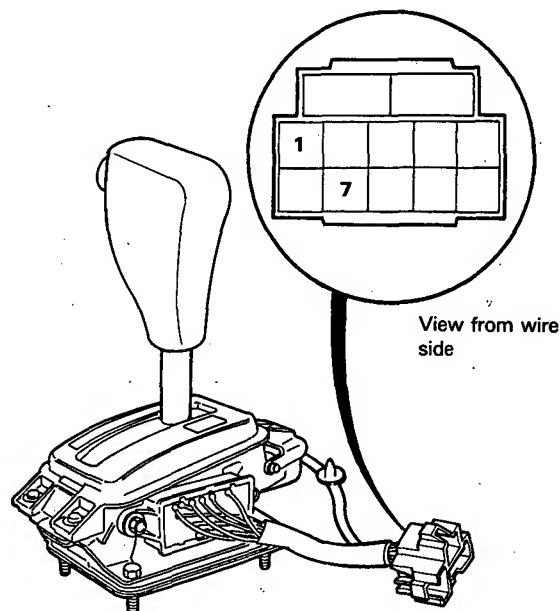
1. Remove the front console, then disconnect the 10-P connector from the switch.
2. Check for continuity between the terminals in each switch position according to the table.

### NOTE:

- Move the lever back and forth without touching the push button at each position, and check for continuity within the range of free play of the shift lever.
- If there is no continuity within the range of free play, adjust the installation position of the switch (see page 23-131).

### A/T Gear Position Switch (For cruise control)

Terminal	1	7
Position		
2	○	○
S	○	○
D	○	○
N		
R		
P		

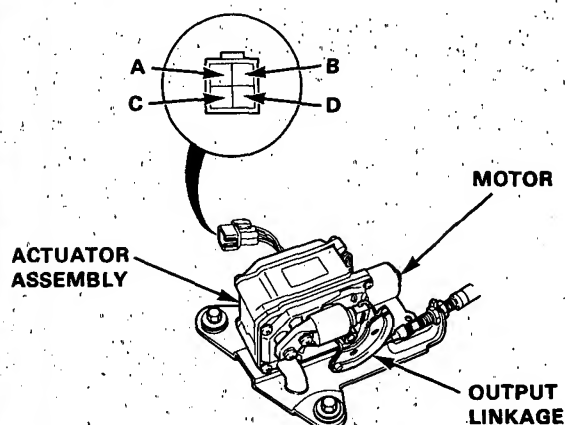


3. If necessary, replace the switch (see page 23-131) or adjust it (see page 23-130).

# Cruise Control

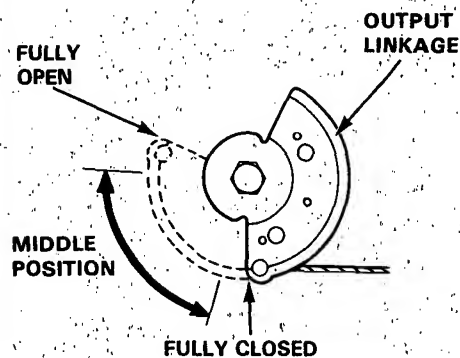
## Actuator Assembly Test

1. Disconnect the 4-P connector from the actuator.
2. Check that the output linkage for smooth movement.
3. Connect battery power to the D terminal and ground to the A terminal.
4. Check for a clicking sound from the magnetic clutch, and that the output linkage is locked.
5. If the output linkage is not locked, replace the actuator assembly.



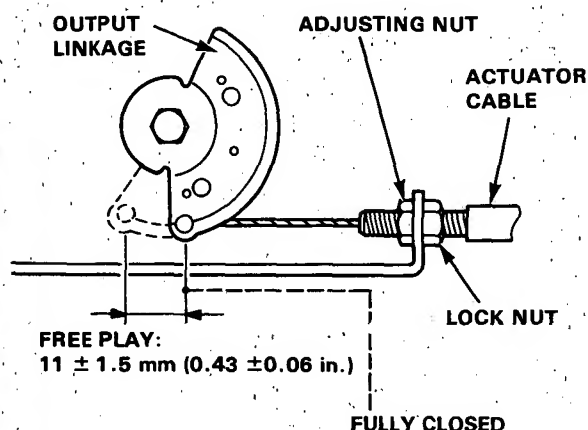
6. Check the operation of the actuator motor in each output linkage position according to the table. You should be able to hear the motor.

Battery polarities		Output linkage position		
⊕	⊖	FULL CLOSE	MIDDLE POSITION	FULL OPEN
C Terminal	B Terminal	The motor runs	The motor runs	The motor stops
B Terminal	C Terminal	The motor stops	The motor runs	The motor runs



## Actuator Cable Adjustment

1. Check that the actuator cable operates smoothly with no binding or sticking.
2. Start the engine and warm it up to normal operating temperature (radiator and condenser fans come on twice).
3. Measure how far the output linkage moves from the fully closed position before the engine speed starts to increase. Free play should be  $11 \pm 1.5 \text{ mm}$  ( $0.43 \pm 0.06 \text{ in.}$ ).



4. If the free play is not within specs, loosen the locknut and turn the adjusting nut as required.

NOTE: If necessary, check the throttle control system (see section 11), then recheck the output linkage free play.

5. Retighten the locknut and recheck the free play.

# Automatic Shoulder Seat Belt (USA)



## Component Location Index

### • SEAT BELT REMINDER LIGHT

(In gauge assembly)

Replacement, page 23-114

### • DOOR LATCH SWITCH

(In door lock assembly)

Test, page 23-252

### DRIVER'S SHOULDER SEAT BELT RETRACTOR

(With solenoid sensor switch and solenoid)

Test, page 23-248

Replacement/Inspection, section 20

### FRONT PASSENGER'S SHOULDER SEAT BELT RETRACTOR

(With solenoid sensor switch and solenoid)

Test, page 23-248

Replacement/Inspection, section 20

### DRIVER'S REAR LOCK POSITION SWITCH (ANCHOR SWITCH and SHOULDER SEAT BELT SWITCH)

Test, page 23-250

### DRIVER'S SHOULDER SEAT BELT ANCHOR RAIL ASSEMBLY

Replacement, section 20

### FRONT PASSENGER'S REAR LOCK POSITION SWITCH (ANCHOR SWITCH and SHOULDER SEAT BELT SWITCH)

Test, page 23-250

### SHOULDER SEAT BELT BUCKLE

### FRONT POSITION SWITCH

Test, page 23-251

### SHOULDER BELT

### FRONT PASSENGER'S SHOULDER BUCKLE MOTOR

Test, page 23-249

### FRONT POSITION SWITCH

Test, page 23-251

### AUTOMATIC SHOULDER SEAT BELT CONTROL UNIT

Input Test, 23-246

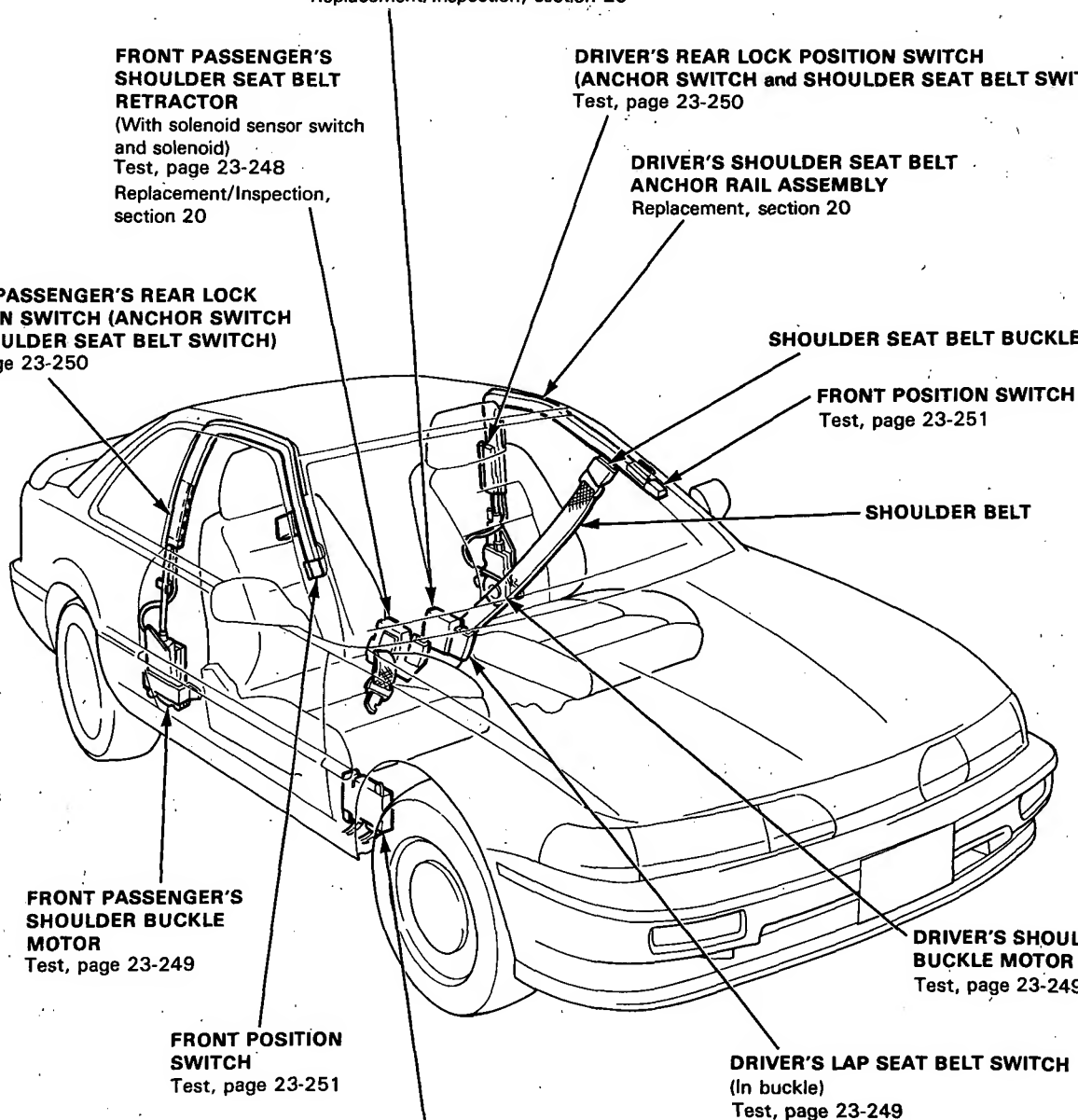
### DRIVER'S SHOULDER BUCKLE MOTOR

Test, page 23-249

### DRIVER'S LAP SEAT BELT SWITCH

(In buckle)

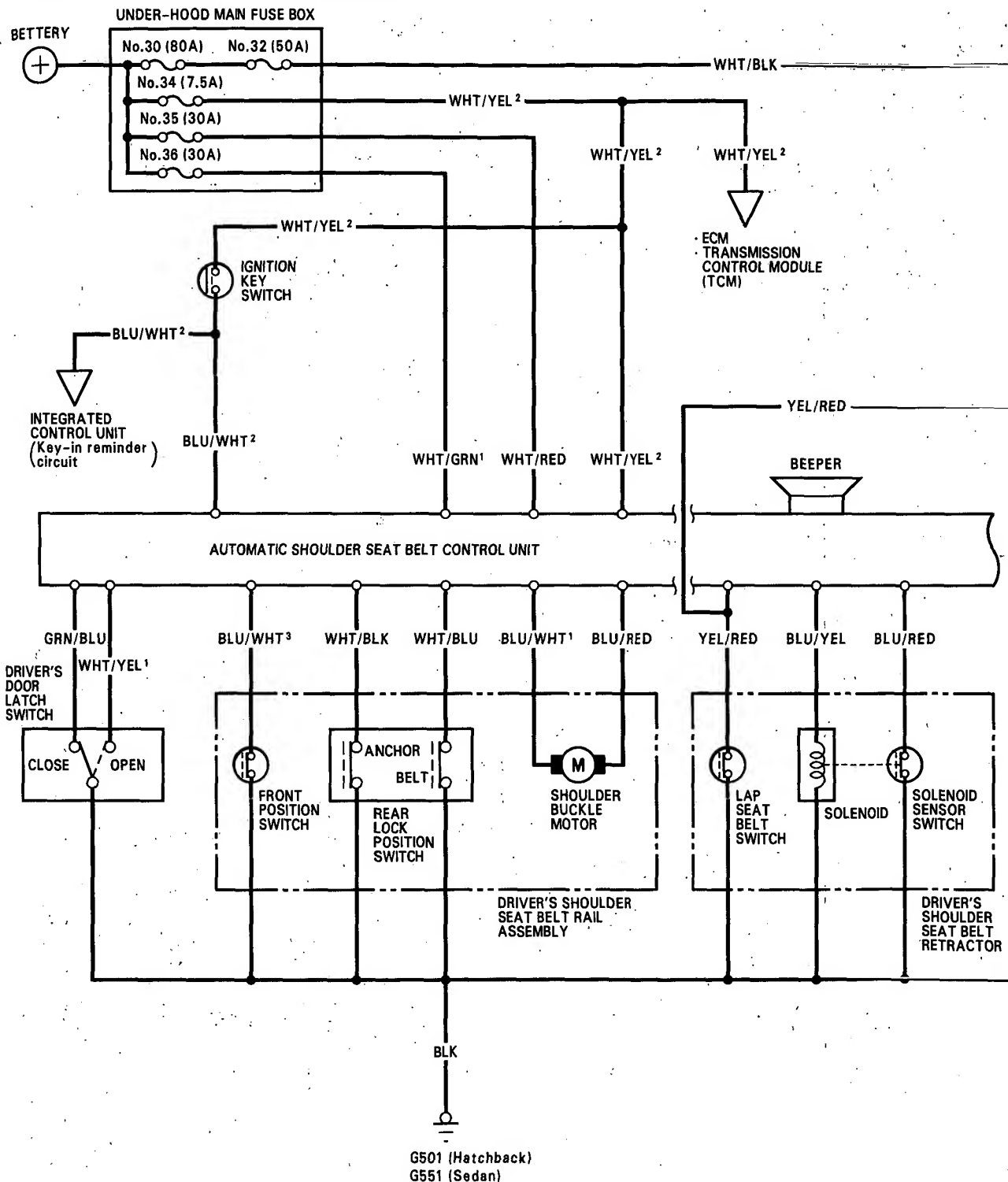
Test, page 23-249



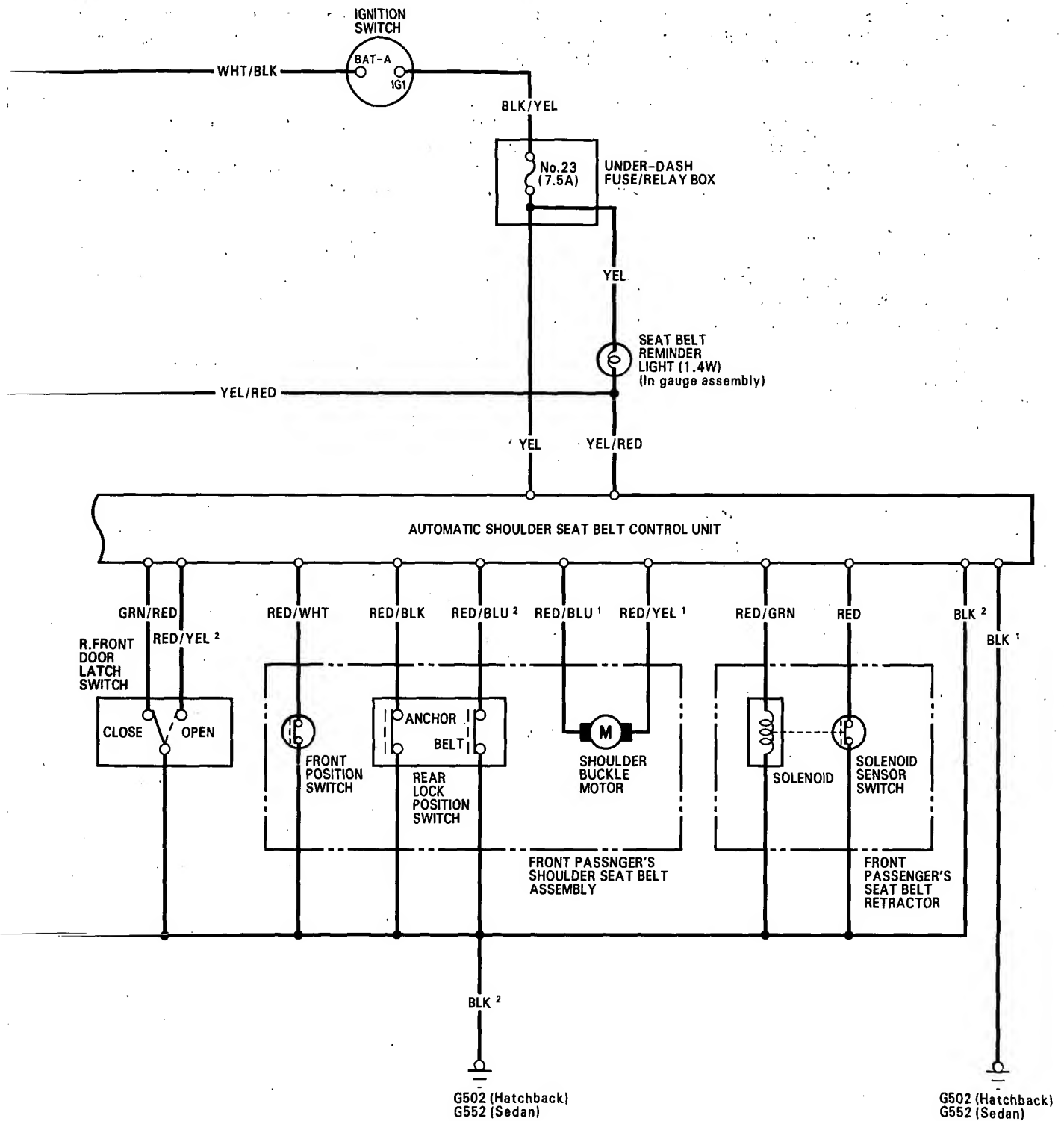
# Automatic Shoulder Seat Belt

## Circuit Diagram

NOTE: Different wires with the same color have been given a number suffix to distinguish them (for example, BLU/WHT<sup>1</sup> and BLU/WHT<sup>2</sup> are not the same).



Front Position Switch OFF: Buckle is in the front position.  
 Rear Lock Position Anchor Switch OFF: Buckle is in the rear lock position.  
 Rear Lock Position Belt Switch OFF: Buckle is in the rear lock position and shoulder seat belt buckled.  
 Solenoid Sensor Switch OFF: Door is open.  
 Lap Seat Belt Switch OFF: Driver's lap seat belt is buckled.



# Automatic Shoulder Seat Belt

## Description

The automatic shoulder belt system is a combination of mechanical and electrical components. An electronic control unit monitors several switches to automatically control the movement of the belt. The control unit also monitors the shoulder belt electrical system, and will turn on an indicator light and buzzer if it detects a malfunction. The shoulder belt will lock if the car suddenly accelerates or decelerates in any direction, or if it tilts too far in any direction. The locking is done mechanically, and is not affected by the electrical components in the system.

### Seat Belt Control Unit

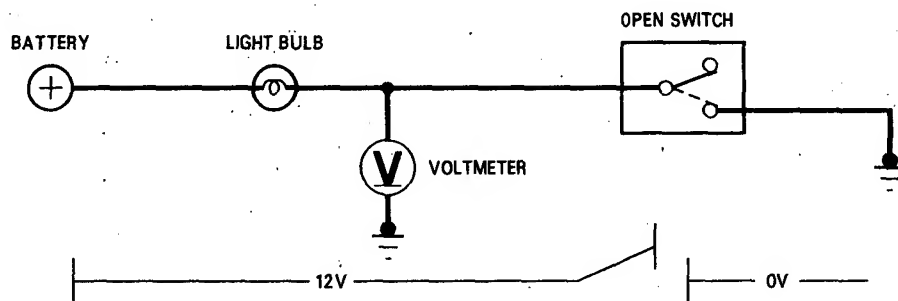
The seat belt control unit operates the shoulder belt motors, shoulder belt retractor solenoids, seat belt indicator light, and beeper. The control unit decides where to position the shoulder belt by monitoring switches in the door latches and in the seat belt tracks. It also continuously monitors those same switches to determine whether the shoulder belts are in the correct position. If the control unit detects a belt in the wrong position, it turns on the indicator light and beeper.

### Understanding Reference Voltage

The control unit uses a "reference" voltage to monitor the switches. The following illustrations show how the voltage can change in portions of a circuit, depending on the position of a switch. These changes enable the control unit to determine whether a switch is open or closed.

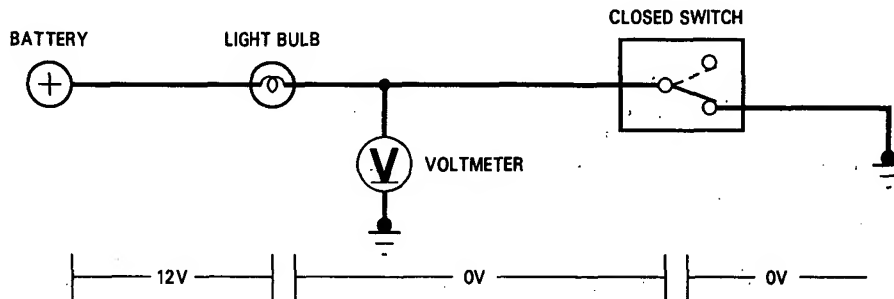
A simple light bulb circuit can be used to show how this "reference" voltage works:

In this illustration, the switch is open; the circuit is not complete. A voltmeter would indicate battery voltage all the way up to the open switch.

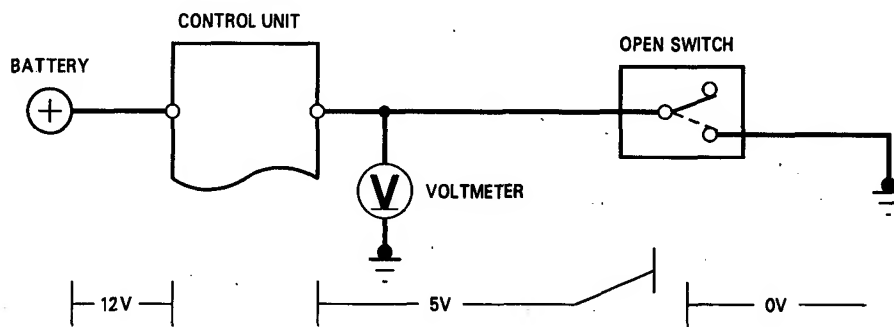




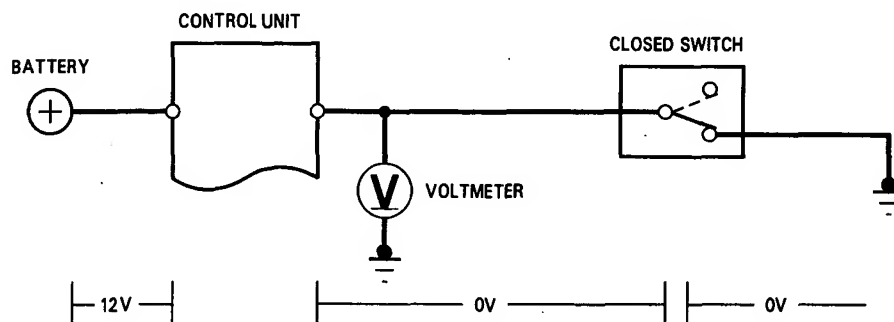
In this illustration, the switch is closed; the circuit is complete. A voltmeter would indicate battery voltage only up to the light bulb. There is no voltage after the bulb because it's "used up" across the bulb filament. The light bulb is the load.



In this illustration, the switch is open; the circuit is not complete. There is battery voltage from the battery to the control unit, and a reference voltage sent by the control unit to the switch. A voltmeter would indicate battery voltage up to the control unit, and control unit reference voltage between the control unit and the open switch.



In this illustration, the switch is closed; the circuit is complete. A voltmeter would indicate battery voltage only up to the control unit. There is no voltage after the control unit because the control unit "used it up". The control unit is the load.



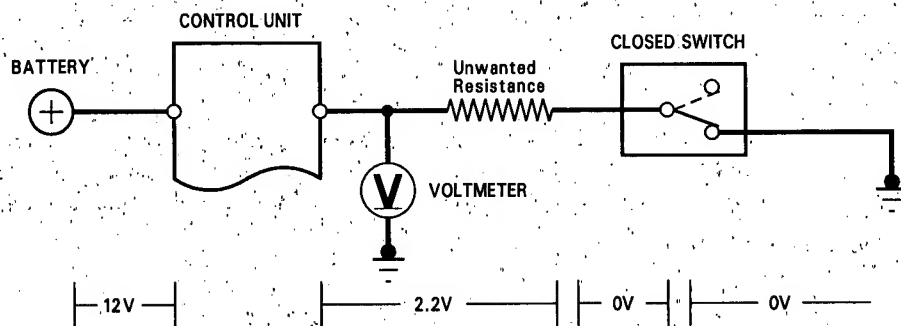
(cont'd)

# Automatic Shoulder Seat Belt

## Description (cont'd)

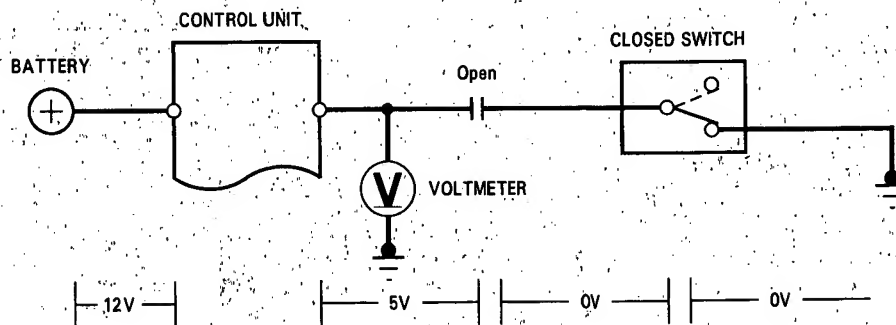
The control unit is supplied with the battery voltage. The control unit then sends a reference voltage to the switch. The reference voltage will change, depending on the position of the switch and the condition of the circuit. The change in voltage is what the control unit monitors to determine whether the switch is open or closed. If you check voltage at the control unit (between the control unit and the switch, with a digital voltmeter), the meter will pick up any excessive resistance, an open, or a short in the circuit. The following illustrations show how circuit voltage readings would change because of excess resistance, an open, or a short.

In this illustration, the switch is closed; the circuit is complete. The reference voltage is 2.2 V. The voltage should be zero with the switch closed, but the unwanted resistance in the circuit creates a second load (the first load is the control unit). Voltage is always used up across all the load(s) in a circuit as long as the circuit is complete (current is flowing). The 2.2 V measured are actually the voltage drop across the unwanted resistance.



The unwanted resistance may "confuse" the control unit as to whether the switch is open or closed because when the switch is closed, the reference voltage should be zero. As the unwanted resistance becomes higher, the reference voltage will increase accordingly.

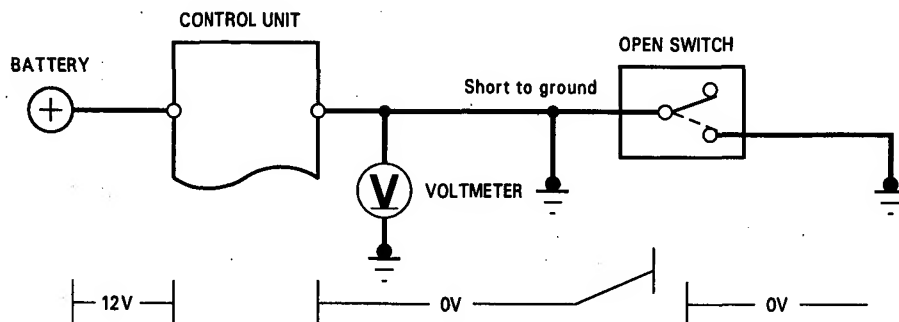
In this illustration, the switch is closed; the circuit should be complete. But since the wire between the control unit and the switch is open, the circuit is not complete. The reference voltage will be exactly the same as if the switch were open.







In this illustration, the wire from the control unit to the switch is shorted to body ground. This completes the circuit, even though the switch is still open. The reference voltage will be the same as if the switch were closed.



#### Retractor

When either front door is opened, the seat belt control unit is signalled by the door latch switch. The control unit energizes the shoulder belt retractor solenoid(s), and then moves the shoulder belt(s) to the appropriate position.

When the shoulder belt is moved from the rearward to forward position it must unwind from the retractor assembly. If it does not, the shoulder belt motor will stall. The retractor solenoid is energized to prevent the retractor from locking. If the retractor were to lock while the belt was being moved to/from the front/rear position, the motor could stall.

If the retractor solenoid is functioning properly, the following condition may still occur: it does not indicate any problem with the system. If there actually is a problem with the system, the indicator light will go on and the beeper will sound.

For the shoulder belt to travel forward the belt must unwind from the retractor. So, before the control unit signals the shoulder belt to move forward, the retractor solenoid is energized. If the shoulder belt is locked, and then the retractor solenoid is energized, it will remain locked (the solenoid cannot override the mechanical lock). The control unit signals the retractor motor to drive the belt forward, but, in this situation, the motor will stall.

**NOTE:** The retractor may be locked because of conditions. It may not be apparent the retractor is locked until the motor tries to drive the belt forward. If the retractor is locked, relieve the tension on the belt and allow it to retract to unlock the retractor.

#### Track Assembly

The shoulder belt track assembly consists of the shoulder belt motor, cables, tracks, a front position switch, a rear lock position switch (anchor), and a rear lock position switch (seat belt).

The shoulder belt track assembly contains the buckle receptacle for the shoulder belt. The control unit signals the motor to drive the shoulder belt forward and rearward, and monitors the switches to determine where the shoulder belt is positioned. It also monitors the rear lock position switch (seat belt) to determine whether the shoulder belt is buckled.

(cont'd)

# Automatic Shoulder Seat Belt

## Seat Belt Operation

### Control Unit

The control unit positions the shoulder belts according to inputs from the ignition switch, the door latch switches (located in the latch assemblies), and the front and rear position switches, located in the shoulder belt track assembly.

When the ignition switch is turned ON and the key removed, the control unit will monitor the door switches, and the front and rear position switches to determine where the shoulder belt is located. If the belt is not in the proper position, the control unit will move it to the correct position. In a properly functioning system, the belts should be in the following positions:

Ignition key position	Door position		Shoulder belt position	
	Left	Right	Left	Right
ON	closed	closed	rear	rear
ON	open	closed	forward	rear
ON	open	open	forward	forward
ON	closed	open	rear	forward

When the ignition switch is turned OFF and the key removed, the driver's side shoulder belt will travel forward and remain there, regardless of the driver's door position. The passenger's belt will remain in the rearward position if the passenger's door is not opened. If the passenger's door is opened, the shoulder belt will travel forward and remain there.

Ignition key position	Door position		Shoulder belt position	
	Left	Right	Left	Right
OFF, key removed	closed	closed	forward	rear
OFF	open	closed	forward	rear
OFF	open	open	forward	forward
OFF, key removed	closed	open	forward	forward



## Monitor Switches

The seat belt control unit monitors all the switches in the automatic shoulder belt system. This chart explains how each switch in the system is "read" by the control unit.

Switch	Function
Door latch switch	The door latch switch has two positions. The control unit has two wires going to this switch. When the door is closed, one wire will be switched to body ground and the other will be opened. When the door is opened, the condition will reverse.
Front position switch	This switch provides a path to ground (the switch is closed) when the shoulder belt is not in the forward position. The switch is open when the shoulder belt is in the forward position (this creates an open in the circuit).
Rear lock position switch (anchor)	This switch provides a path to ground (the switch is closed) when the shoulder belt is not in the rearward position. The switch is open when the shoulder belt is in the rearward position (this creates an open in the circuit).
Rear lock position switch (seat belt)	This switch provides a path to ground (the switch is closed) when the shoulder belt is not in the rearward position. The switch is open when the belt is in the rear position and the shoulder belt is buckled (this creates an open circuit).
Lap seat belt switch	This switch provides a path to ground (the switch is closed) when the lap belt is not buckled. The switch is open when the lap belt is buckled.
Solenoid sensor switch	This switch provides a path to ground (the switch is closed) when the solenoid is not energized. The switch is open when the solenoid is energized.

(cont'd)

# Automatic Shoulder Seat Belt

## Seat Belt Operation (cont'd)

### Troubleshooting Tips

- If the seat belt light and beeper are on, the control unit input test will locate the problem.
- When the input test indicates the voltage should be 1 volt or less, or 0.03 V volts or less, it means exactly what it says. If the voltage exceeds 1 volt there is too much circuit resistance.
- If one of the input tests is failed, the system must be repaired before further testing. If you continue testing, the system gives false results on a later test.
- In the "Test: Desired result" section of the input test, it may indicate what position the shoulder buckle should be in. If the buckle is not in that position, the test results will be incorrect.
- The entire circuit must be checked if the system fails a voltage test. The circuit consists of the wire to the switch, the switch, the wire from the switch, and the ground connection.
- The control unit connectors are part of the circuit. If necessary, remove the female terminals from the back of the connector and adjust them to fit the control unit male terminals snugly.



## Electrical Troubleshooting

### NOTE:

- The numbers in the table show the troubleshooting sequence.
- Before troubleshooting:
  - Check the No. 23 (7.5 A) fuse in the under-dash fuse/relay box and the No. 34 (7.5 A), No. 35 (30 A) and No. 36 (30 A) fuses in the under-hood main fuse box.
  - Check that the reminder light comes on for about six seconds when the driver's door is opened and the ignition switch is turned on. If it doesn't come on, check for an open circuit or blown bulb.
  - Move the car to your dealer's back lot or some other quiet place where you won't be a road hazard. Drive the car between 10 and 15 mph (16 and 24 km/h), lean forward against the shoulder belt and abruptly apply the brakes, not hard, just enough to dip the front end. You should feel the belt lock as the front end dips. If the shoulder belt locks, its locking mechanism is working.

Item to be inspected		Symptom	Foreign matter stuck between anchor rail and shoulder buckle, or cable not attached properly.	Shoulder buckle motor		Door latch switch stuck closed or opened		Seat belt retractor solenoid and sensor switch		Front position switch		Rear lock position switch		Ignition key switch		Driver's lap seat belt switch		Control unit input test		Poor ground	Open circuit, loose or disconnected terminals.
				Driver's	Front passenger's	Driver's	Front passenger's	Driver's	Front passenger's	Driver's	Front passenger's	Driver's	Front passenger's	Front passenger's	Ignition key switch	Driver's lap seat belt switch	Control unit input test				
The shoulder seat belt buckle does not move, but shoulder buckle motor runs.			1																		
The shoulder buckle motor does not run.	Driver's		2													1	G501, G502 or G551, G552		BLU/WHT <sup>1</sup> or BLU/RED		
	Front passenger's		2													1	G501, G502 or G551, G552		RED/BLU <sup>1</sup> or RED/YEL <sup>1</sup>		
The shoulder buckle stops on the way between the rear lock and the front position.	Driver's		1			3		4								2					
	Front passenger's		1				3		4							2					
The shoulder seat belt retractor locks when the ignition switch is OFF and the door is open.	Driver's					2		3								1			BLU/YEL, GRN/BLU or WHT/YEL <sup>1</sup>		
	Front passenger's						2		3							1			RED/GRN, GRN/RED or RED/YEL <sup>2</sup>		
The shoulder seat belt buckle motor runs normally, but the reminder light comes on and the beeper sounds.										3	3	2	2		4	1			YEL/RED		
Driver's shoulder seat belt buckle does not shift to front position from rear lock position when the ignition key is removed.															1						

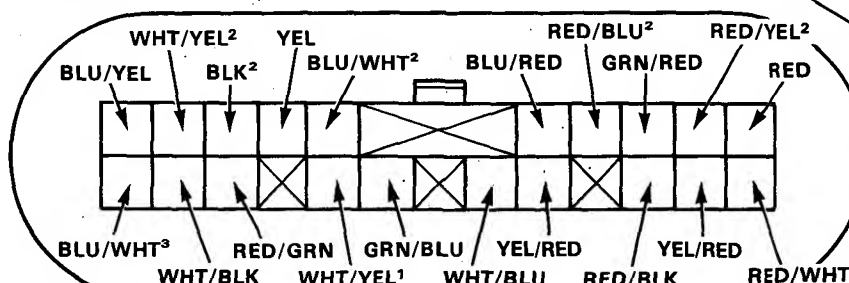
# Automatic Shoulder Seat Belt

## Control Unit Input Test

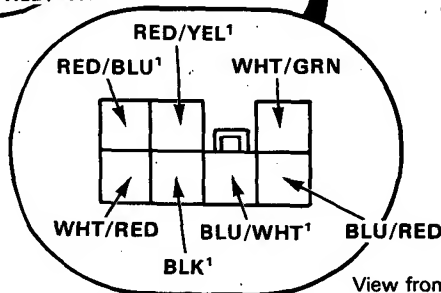
Remove the right kick panel and disconnect the 7-P and 22-P connectors from the control unit.  
Make the following input tests at the connectors.

### NOTE:

- Recheck the connections between the 7-P, 22-P connectors and the control unit; then replace the control unit if all input tests prove OK.
- Different wires with the same color have been given a number suffix to distinguish them (for example, WHT/GRN<sup>1</sup> and WHT/GRN<sup>2</sup> are not the same).



View from wire side



View from wire side

No.	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
1	WHT/GRN <sup>1</sup>	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 36 (30 A) fuse.</li> <li>• An open in the wire.</li> </ul>
2	WHT/RED	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 35 (30 A) fuse.</li> <li>• An open in the wire.</li> </ul>
3	BLK <sup>1</sup>	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (Hatchback: G502, Sedan: G552).</li> <li>• An open in the wire.</li> </ul>
4	BLU/WHT <sup>1</sup> and BLU/RED (or RED/BLU <sup>1</sup> and RED/YEL <sup>1</sup> )	Connect the BLU/WHT <sup>1</sup> (or RED/BLU <sup>1</sup> ) terminal to the WHT/GRN <sup>1</sup> terminal, and the BLU/RED (or RED/YEL <sup>1</sup> ) terminal to the BLK <sup>1</sup> terminal when the shoulder buckle is in front position.	Check shoulder buckle motor operation: Driver's (or passenger's) shoulder buckle should slide from the front position to the rear lock position. When reversing the test leads, motor direction should change.	<ul style="list-style-type: none"> <li>• Faulty shoulder buckle motor or rail.</li> <li>• An open in the wire.</li> </ul>
5	BLK <sup>2</sup>	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> <li>• Poor ground (Hatchback: G501, 502, Sedan: G551, 552).</li> <li>• An open in the wire.</li> </ul>
6	WHT/YEL <sup>2</sup>	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>• Blown No. 34 (7.5 A) fuse.</li> <li>• An open in the wire.</li> </ul>



No.	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
7	BLU/WHT <sup>2</sup>	Ignition key turned from "II" to "O" position.	Check for voltage to ground: There should be battery voltage when the ignition key is turned from "II" to "O" position and no voltage when it is removed.	<ul style="list-style-type: none"> <li>Faulty ignition key switch.</li> <li>An open in the wire.</li> </ul>
8	YEL	Ignition switch ON.	Check for voltage to ground: There should be battery voltage	<ul style="list-style-type: none"> <li>Blown No. 23 (7.5 A) fuse.</li> <li>An open in the wire.</li> </ul>

NOTE: With ignition switch ON, connect the 7-P and 22-P connectors to the control unit and perform tests 10 thru 16.

9	GRN/BLU or (GRN/RED)	Driver's (or passenger's) door closed.	Check for voltage to ground: There should be less than 1 V.	<ul style="list-style-type: none"> <li>Short to ground.</li> <li>Faulty door latch switch.</li> <li>Faulty control unit.</li> </ul>
		Driver's (or passenger's) door open.	Check for voltage to ground: There should be approx. 5 V or more.	<ul style="list-style-type: none"> <li>An open in the wire.</li> <li>Faulty door latch switch.</li> </ul>
10	WHT/YEL <sup>1</sup> or (RED/YEL <sup>2</sup> )	Driver's (or passenger's) door open.	Check for voltage to ground: There should be less than 1 V.	<ul style="list-style-type: none"> <li>An open in the wire.</li> <li>Faulty door latch switch.</li> </ul>
		Driver's (or passenger's) door closed.	Check for voltage to ground: There should be approx. 5 V or more.	<ul style="list-style-type: none"> <li>Short to ground.</li> <li>Faulty door latch switch.</li> <li>Faulty control unit.</li> </ul>
11	WHT/BLK or (RED/BLK)	Driver's (or passenger's) door open	Check for voltage to ground: There should be 0.03 V or less when the shoulder buckle is not in the rear lock position.	<ul style="list-style-type: none"> <li>Short to ground.</li> <li>Faulty rear lock position (anchor) switch.</li> <li>Faulty control unit.</li> </ul>
		Driver's (or passenger's) door closed.	Check for voltage to ground: There should be approx. 5 V or more when the shoulder buckle is in the rear lock position.	<ul style="list-style-type: none"> <li>An open in the wire.</li> <li>Faulty rear lock position (anchor) switch.</li> </ul>
12	WHT/BLK or (RED/BLU <sup>2</sup> )	Driver's (or passenger's) door open	Check for voltage to ground: There should be less than 1 V when the shoulder buckle is not in the rear lock position.	<ul style="list-style-type: none"> <li>Short to ground.</li> <li>Faulty rear lock position (seat belt) switch.</li> <li>Faulty control unit.</li> </ul>
		Driver's (or passenger's) door closed.	Check for voltage to ground: There should be approx. 5 V or more when the shoulder buckle is in the rear lock position and shoulder seat belt is buckled.	<ul style="list-style-type: none"> <li>An open in the wire.</li> <li>Faulty rear lock position (seat belt) switch.</li> </ul>
13	BLU/WHT <sup>3</sup> or (RED/WHT)	Driver's (or passenger's) door open.	Check for voltage to ground: Should be approx. 5 V or more when the shoulder buckle is in the front position.	<ul style="list-style-type: none"> <li>An open in the wire.</li> <li>Faulty front position switch.</li> </ul>
		Driver's (or passenger's) door closed.	Check for voltage to ground: There should be 0.03 V or less when the shoulder buckle is not in the front position.	<ul style="list-style-type: none"> <li>Short to ground.</li> <li>Faulty front position switch.</li> <li>Faulty control unit.</li> </ul>
14	BLU/YEL or (RED/GRN)	Driver's (or passenger's) door open.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>Short to ground.</li> <li>Faulty shoulder seat belt retractor (solenoid).</li> </ul>
		Driver's (or passenger's) door closed.	Check for voltage to ground: There should be less than 1 V.	<ul style="list-style-type: none"> <li>Faulty control unit.</li> </ul>
	BLU/RED or (RED)	Driver's (or passenger's) door open.	Check for voltage to ground: There should be approx. 5 V or more.	<ul style="list-style-type: none"> <li>Short to ground.</li> <li>Faulty shoulder seat belt retractor (sensor switch).</li> <li>Faulty control unit.</li> </ul>
		Driver's (or passenger's) door closed.	Check for voltage to ground: There should be less than 1 V.	<ul style="list-style-type: none"> <li>An open in the wire.</li> <li>Faulty control unit.</li> </ul>
15	YEL/RED <sup>2</sup>	Driver's lap seat belt buckled.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> <li>Short to ground.</li> <li>Faulty driver's shoulder seat belt retractor (lap seat belt switch).</li> <li>Faulty control unit.</li> </ul>
		Driver's lap seat belt unbuckled.	Check for voltage to ground: There should be less than 1 V. The reminder light in the gauge assembly should come on.	<ul style="list-style-type: none"> <li>Blown bulb.</li> <li>An open in the wire.</li> <li>Faulty driver's shoulder seat belt retractor (lap seat belt switch).</li> </ul>

# Automatic Shoulder Seat Belt

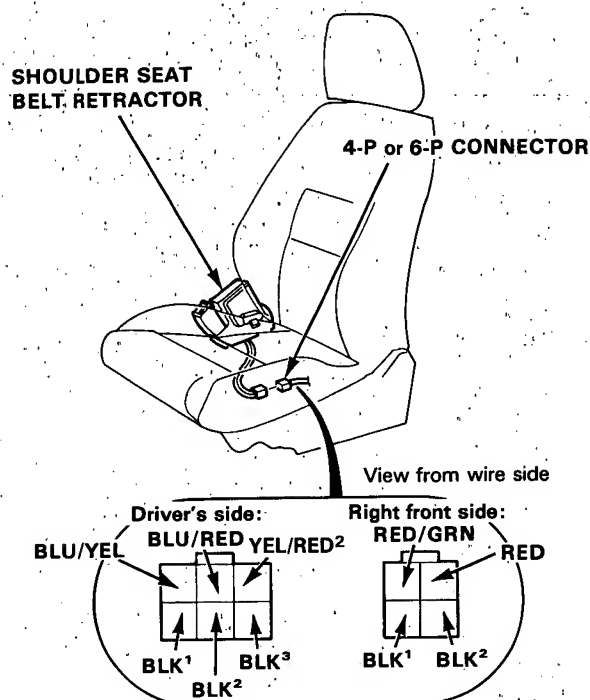
## Retractor Solenoid/Solenoid Sensor Switch Test

**NOTE:** Perform this test on each shoulder seat belt retractor.

1. Slide the front seat forward to disconnect the connector from the shoulder seat belt retractor.
2. Connect the voltmeter positive probe to the BLU/YEL (driver's side) or RED/GRN (right front side) terminal and the negative probe to the BLK<sup>1</sup> terminal of the rear wire harness connector. There should be battery voltage when the door is opened.

- If there is no voltage, check for:
  - An open in the BLU/YEL (driver's side) or RED/GRN (right front side) wire.
  - Poor ground (Hatchback: G501, G502). (Sedan: G551, G552).
  - Control unit input test (see page 23-214).

- If there is battery voltage, go to step 3.



3. Perform retractor solenoid test: With the door open, check for continual clicks of the solenoid plunger whenever the connector is alternately connected and disconnected.

- If it does not click, replace the shoulder seat belt assembly (solenoid is not available separately).

4. Connect the 6-P or 4-P connector to the shoulder seat belt retractor.

5. Perform solenoid sensor switch test: Check for voltage between the BLU/RED (+) and BLK<sup>2</sup> (-) terminals of the 6-P connector (driver's side), or between the RED (+) and BLK<sup>2</sup> (-) terminals of the 4-P connector (right front side) when the door under test is opened and closed.

There should be approx. 5V or more when the door is opened and less than 1V when the door is closed.

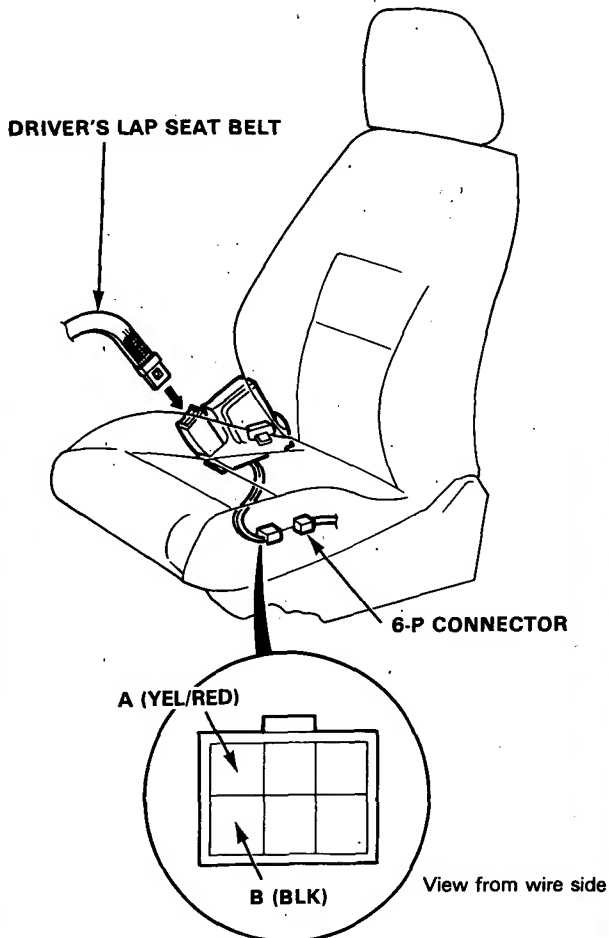
- If there is an abnormality, replace the shoulder seat belt assembly.





## Driver's Lap Seat Belt Switch Test

1. Slide the driver's seat forward to disconnect the 6-P connector from the shoulder seat belt retractor.
2. There should be continuity between the A (YEL/RED) and B (BLK) terminals when the driver's lap seat belt is not buckled. There should be no continuity when the driver's lap seat belt is buckled.



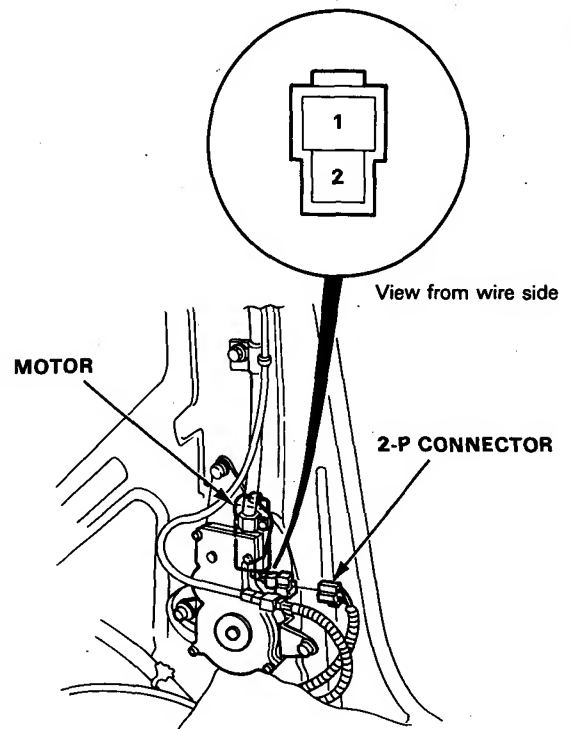
## Shoulder Buckle Motor Test

1. Remove the quarter panel or B pillar lower panel (see section 20).
2. Disconnect the 2-P connector from the shoulder buckle motor.
3. Test the motor by connecting power and ground to the No. 1 and No. 2 terminals. Test the motor in each direction, by switching the leads from the battery.

**CAUTION:** When the motor stops running, disconnect a battery terminal immediately.

4. If the motor does not run, replace the shoulder seat belt rail assembly (see section 20).

**NOTE:** Driver's motor shown; front passenger's motor is similar.



# Automatic Shoulder Seat Belt

## Rear Lock Position Switch Test

1. Remove the quarter panel or B pillar lower panel (see section 20).
2. Disconnect the 2-P connector from the shoulder buckle motor and the 4-P connector from the rear lock position switch.
3. Check for continuity between the terminals in each buckle position according to the table.

NOTE: When power and ground connected to terminals (No. 1 and No. 2), the shoulder buckle motor will run. Consequently, the shoulder buckle will move back and forth (see motor test on page 23-249).

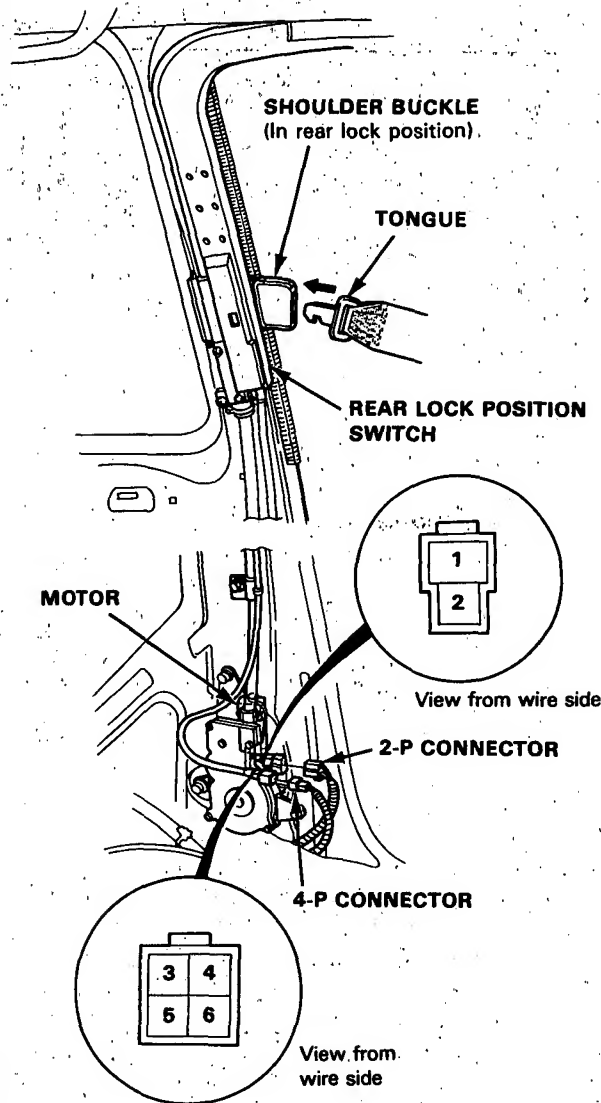
CAUTION: When the motor stops running, disconnect a battery terminal immediately.

### Shoulder Seat Belt Switch

Terminal		3	4
Position			
Rear lock Position	Seat belt buckled		
	Seat belt unbuckled	○ — ○	○ — ○
Other positions		○ — ○	○ — ○

### Anchor Switch

Terminal		5	6
Position			
Rear lock position			
Other positions		○ — ○	○ — ○



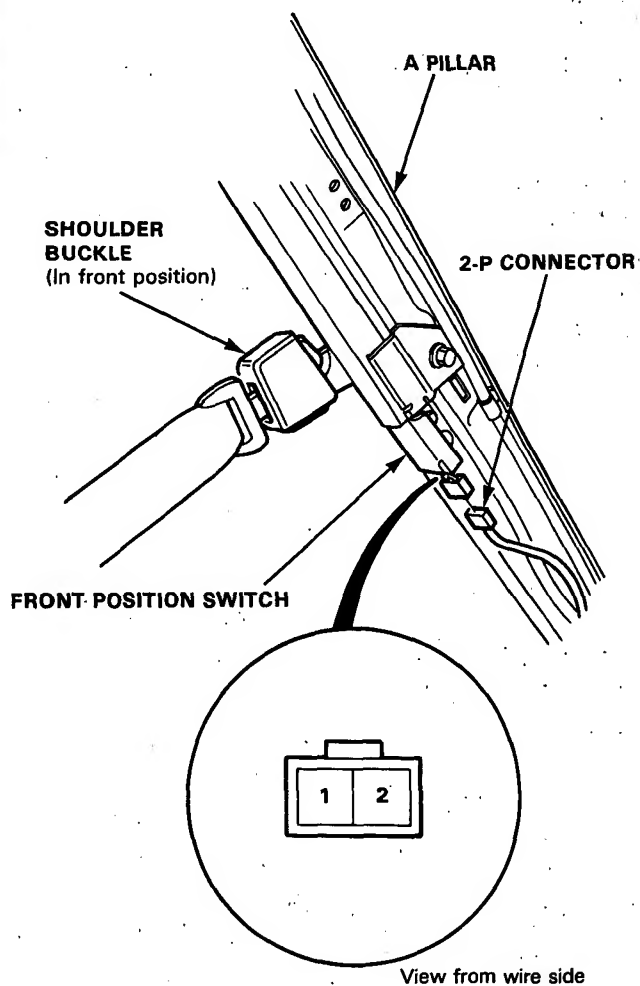
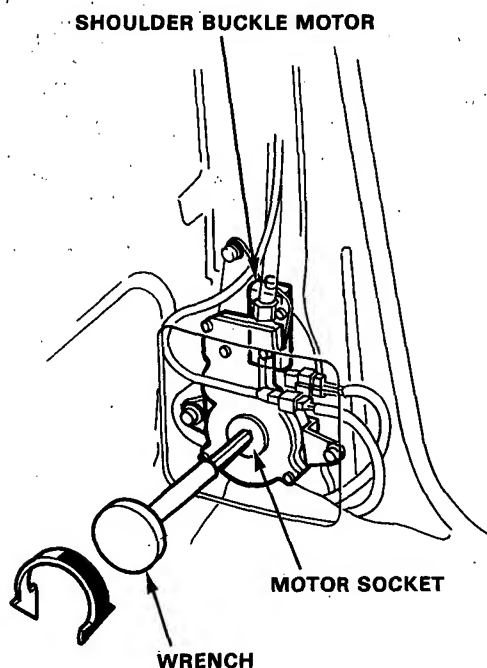


## Front Position Switch Test

**CAUTION:** Always remove the No. 35 (30 A) or No. 36 (30 A) shoulder buckle motor fuse in the main fuse box before testing, otherwise the motor may suddenly activate.

1. Remove the A pillar panel (see section 20).
2. Disconnect the 2-P connector from the front position switch.
3. Check for continuity between the No.1 and No.2 terminals.  
There should be no continuity when the shoulder buckle is in the front position.  
There should be continuity when the shoulder buckle is not in the front position.

**NOTE:** Operate the shoulder buckle motor manually by inserting the wrench provided in the tool bag into the motor socket.



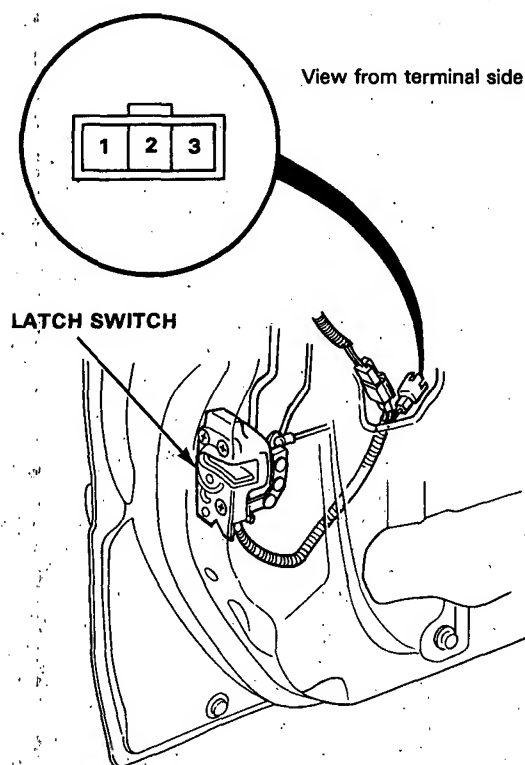
# Automatic Shoulder Seat Belt

## Door Latch Switch Test

1. Remove the door panel.
2. Disconnect the 3-P connector from the switch.
3. Check for continuity between the terminals in each door position according to the table.

Terminal Position	1	2	3
OPEN	○	○	
CLOSE		○	○

NOTE: Driver's door latch switch is shown; front passenger's door latch switch is similar.





# Wiring Diagrams

## Index

Air Conditioning .....	13
Anti-lock Brake System (ABS) .....	14
Automatic Shoulder Seat Belt .....	11
Transmission Control Module (TCM) .....	13
Battery .....	1
Blower Controls .....	13
Charging System .....	1
Cigarette Lighter .....	7
Clock .....	7
Cruise Control .....	10
Defogger, Rear Window .....	8
Fuel and Emissions .....	12
Gauges .....	3
Heater Controls .....	13
Horn .....	7
Ignition Switch .....	1
Ignition System .....	1
Integrated Control Unit .....	4
Inter lock System .....	4
Lights, Exterior .....	
Back-up Lights .....	7
Brake Lights .....	7
Front Fog Lights .....	5 or 6
Hazard Warning Lights .....	7
Headlights .....	5 or 6
License Plate Lights .....	5 or 6
Marker Lights .....	5 or 6
Taillights .....	5 or 6
Turn Signal Lights .....	7
Lights, Interior .....	
Dash lights Brightness Control .....	5 or 6
Ceiling Light .....	7
Glove Box Light .....	5 or 6
Map Light, Front .....	7
Trunk/Cargo area light .....	7

Lighting System	
(USA) .....	5
(Canada) .....	6
Lock, Power .....	9
Mirror, Power .....	8
Starting System .....	1
Stereo Sound System .....	8
Moonroof .....	8
Radiator and Condenser Fan Controls .....	2
Side Marker/Turn Signal/	
Hazard Flasher System .....	7
Indicator .....	
ABS Indicator .....	3
Brake System .....	3
Door Open Indicator (USA) .....	3
Key-in Reminder .....	4
Lights-on Reminder .....	4
Low Fuel Indicator .....	3
Engine Oil Pressure Indicator .....	3
Seat Belt Reminder .....	3
Washers .....	
Windshield .....	10
Rear Window .....	10
Windows, Power .....	9
Wipers .....	
Windshield .....	10
Rear window .....	10

